NOTICE:

"BEST AVAILABLE COPY"

PORTIONS OF THE FOLLOWING DOCUMENT ARE ILLEGIBLE

The Administrative Record Staff

FINAL

INTERIM REMEDIAL ACTION BENCH SCALE TREATABILITY STUDY REPORT VOLUME III LABORATORY REPORTS WATER QUALITY PARAMETERS AND TOTAL SUSPENDED SOLIDS ANALYSIS

903 Pad, Mound, and
East Trenches Areas
(South Walnut Creek)

Operable Unit No 2

Environmental Restoration Program

May 22, 1992

U S DEPARTMENT OF ENERGY
Rocky Flats Plant
Golden, Colorado

REVIEWED FOR CLASSIFICATION/UCNI
By [illegible] UNU
Date June 30, 1992
[illegible] 8/19/92

22558/R7.TS 05-18-92/RPT/2

A-OU02-000370

ADMIN RECORD

FINAL

INTERIM REMEDIAL ACTION BENCH SCALE TREATABILITY STUDY REPORT VOLUME III LABORATORY REPORTS WATER QUALITY PARAMETERS AND TOTAL SUSPENDED SOLIDS ANALYSIS

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Date June 30, 1992
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22558/R7 TS 05-18-92/RPT/2

ADMIN RECORD

Hazen Research, Inc
Total Suspended Solids
CPF Rounds 1 and 2

HAZEN RESEARCH, INC.
ANALYTICAL DEPARTMENT
DATA TRANSMITTAL FORM

PROJECT 7488
CLIENT WOODWARD-CLYDE FEDERAL SERVICES
CONTRACT WCC 22558E/WCFS 4020

PARAMETER TOTAL SUSPENDED SOLIDS

DATE OF TRANSMITTAL 11/21/90

LAB CONTROL NUMBERS. K360-1 to 13

Documents (check if present)

- ✓ Case Narrative
- ✓ Lab Replicates
- ✓ Holding Time Summary
- ✓ Sample Results Data
- ✓ Oven logbook page(s)
- ✓ Chain of Custody

DATA COMPILER/REVIEWER

D Yheaulon / [illegible]

PROJECT 7488

WOODWARD-CLYDE FEDERAL SERVICES

WCC 22558E/WCFS 4020

TOTAL SUSPENDED SOLIDS

LAB CONTROL NUMBERS K360-1 to 13 (12CPF1ØØ1, 12CPF1ØØ2, 11CPF1ØØ3, 11CPF1ØØ4, 11CPF1ØØ5, 11CPF1ØØ6, 11CPF1ØØ7, 11CPF1ØØ8, 11CPF1ØØ9, ~~11CPF1Ø~~ 11CPF1Ø1
CASE NARRATIVE 11CPF1Ø12, 11CPF1Ø13) 2008

ABNORMALITIES	N/A	OK	PROBLEM *
Instrumentation		✓	
Procedural		✓	
Sample Collection		✓	
Sample Storage		✓	
Sample Preservation		✓	
Containers		✓	
Holding Times		✓	
Other _____			

* If problem or abnormality, explain below

PROJECT 7488

WOODWARD-CLYDE FEDERAL SERVICES

WCC 22558E/WCFS 4020

TOTAL SUSPENDED SOLIDS ANALYSIS

LAB REPLICATES DATA

Sample No	1st Analysis	2nd Analysis	Mean	Difference as % of Mean
K360-13	178	190	184	6.52

PROJECT 7488

WOODWARD-CLYDE FEDERAL SERVICES

WCC 22558E/WCFS 4020

TOTAL SUSPENDED SOLIDS ANALYSIS

HOLDING TIME SUMMARY

Sample No	Date Received	Date Analyzed	Calculated Holding time
K360- 1	11/21/90	11/21/90	0 hrs 40 minutes
2			
3			
4			
5			
6			
7			
8			
9			
10			
11			
12			
13			

ANALYSIS WORKSHEET

PRIORITY SUPER RUSH Due by Fri, PM 11/23
REQ TYPE NEW REQUEST
LAB GROUP WATER
GRAVIMETRIC
DIG
MTX
CODE 442 EPA 160.2

Calibration:

Blanks: 1, 10, 10^2, 10^3, 10^4

SOLIDS (SUSPENDED)
11-21-1990 # 9,890 K360/90
LIQUID
FOR PETE LYNCH
PROJECT 7488
PRICE 13 @ $ 19 36 EA
TOTAL PRICE $ 251 68

Factor:

Sample Description	#	MATX	EST	IDEN	S WT	S ALIQ		GROSS	TARE	NET	Result TSS, mg/l
12CPF1 001				1							9
12CPF1 002				2							14
11CPF1 003				3							13
11CPF1 004				4							16
11CPF1 005				5							11
11CPF2 006				6							10
11CPF1 007				7							21
11CPF2 008				8							22
11CPF1 009				9							23
11CPF1 010				10							10
11CPF1 011				11							9
11CPF1 012				12							16
11CPF1 013				13							178
										R13	190

ENTRY NUMBER 9890
COMPLETE 11-23 1990

Special Instructions:

Please identify hazardous sample components:

AREA 7

HAZEN RESEARCH INC.

WATER QUALITY LABORATORY

Analytical Data Form

Parameter: Residue, Non-Filterable (dried @ 103-105 deg C)
Total Suspended Solids (TSS)
Method Reference: EPA-600/4-79-020 method 160.2
Container/Preservative Specification: Plastic/glass
cool to 4 deg C
Analyst DAY Date: 11/21/90

Sample	Aliq (ml)	Crucible	Tare	Gross	mg	mg/l TSS
K360-1	100		24.0650	24.0659	0.9	9.0
9			23.5156	23.5179	2.3	23.0
3			22.4314	22.4327	1.3	13.0
4			24.5023	24.5039	1.6	16.0
5			23.4535	23.4546	1.1	11.0
6			23.4870	23.4880	1.0	10.0
7			21.6517	21.6538	2.1	21.0
8			24.0300	24.0322	2.2	22.0
2			22.0546	22.0560	1.4	14.0
10			25.0505	25.0515	1.0	10.0
11			22.9931	22.9940	0.9	9.0
12			21.6438	21.6454	1.6	16.0
13	50		22.2821	22.2910	8.9	178.0
213	50		23.1979	23.2074	9.5	190.0

Calculation: mg/l TSS = $\frac{(\text{gross-tare}) \times \text{mg} \times 1000}{(\text{aliq})}$

Quality Control:

TEMPERATURE MONITORING OF DRYING OVENS

DATE	ANALYST	TEMP. OF OVEN °C	COMMENTS	TEMP OF OVEN °C	COMMENTS
[illegible]	[illegible]	105		180	
10/27/90	DAY	106	ADJUST TEMP [illegible] 105°C	179	
10/31/90	[illegible]	99	[illegible] TEMP [illegible] 105°C	186	ADJUSTED TEMP [illegible]
11/1/90	DAY	104		180	
11/2/90	DAY	107	ADJUSTED [illegible] 105°C	185	ADJUSTED TEMP [illegible]
11/9/90	DAY	105		181	

BALANCE CALIBRATION CHECKS

ATE	ANALYST	TYPE OF BALANCE	ACTUAL WEIGHTS USED, g					COMMENTS
			0.5000	1.0000	50.00	100.00	200.00	
1/90	DAY	METTLER H34	1.0001	0.4995				
22/90	DAY	METTLER H34	1.0001	0.5000				
1/90	DAY	METTLER H34	0.5000	1.0000	50.0002			
1/90	DAY	METTLER H34	0.4992	1.0001	50.0001			
1/90	DAY	METTLER H34	0.5000	1.0001	50.0004			
1/90	DAY	METTLER H34	0.5000	1.0000	50.0003			

K360 - Pete Lynch proj 7488

Woodward-Clyde Consultants
Stanford Place 3 Suite 1000 4582 South Ulster Street Parkway
Denver Colorado 80237 (303) 694 2770

Chain of Custody Record

COC # ØØ8

PROJECT NO. 22558 Task 500

SAMPLERS: (Signature) BR Clow

DATE	TIME	SAMPLE NUMBER	TSS	BR Clow 11/21/90						NUMBER OF CONTAINERS
11/21/90	1200	12CPF1ØØ1	X							1
	1200	12 CPF1ØØ2	X							1
	1200	11 CPF1ØØ3	X							1
	1200	11 CPF1ØØ4	X							1
	1315	11 CPF1ØØ5	X							1
	1315	11 CPF2ØØ6	X							1
	1515	11 CPF1ØØ7	X							1
		11 CPF2ØØ8	X							1
		11 CPF1ØØ9	X							1
		11 CPF1Ø1Ø	X							1
		11 CPF1Ø11	X							1
		11 CPF1Ø12	X							1
		11 CPF1Ø13	X							1

BR Clow 11/21/90

TOTAL NUMBER OF CONTAINERS

REMARKS (Sample preservation handling procedures etc.)

For Hazen

Matrix - Water

~~All samples stored on ice~~ FEC 11/21/90

Contact personnel
Brian Clow or
Peter Lynch x205

RELINQUISHED BY (Signature)	DATE/TIME	RECEIVED BY (Signature)	RELINQUISHED BY (Signature)	DATE/TIME	RECEIVED BY (Signature)
BR Clow	11/21/90 1540			11/21/90 3:10 PM	S. Jones

METHOD OF SHIPMENT	SHIPPED BY (Signature)	COURIER (Signature)	RECEIVED FOR LAB BY (Signature)	DATE/TIME
			D Sheerlow	11/21/90 4:20 pm

HAZEN RESEARCH, INC
ANALYTICAL DEPARTMENT
DATA TRANSMITTAL FORM

PROJECT 7488
CLIENT: WOODWARD-CLYDE FEDERAL SERVICES
CONTRACT WCC 22558E/WCFS 4020

PARAMETER TOTAL SUSPENDED SOLIDS

DATE OF TRANSMITTAL 11-23-90

LAB CONTROL NUMBERS: K375-1 thru 6

Documents (check if present)

- ✓ Case Narrative
- ✓ Lab Replicates
- ✓ Holding Time Summary
- ✓ Sample Results Data
- ✓ Oven logbook page(s)

✓ Chain of custody

DATA COMPILER/REVIEWER

D Yhearlow / [illegible]

PROJECT 7488

WOODWARD-CLYDE FEDERAL SERVICES

WCC 22558E/WCFS 4020

TOTAL SUSPENDED SOLIDS

LAB CONTROL NUMBERS K375-1 thru 6 (12CPF1014 thru 12CPF1019)

CASE NARRATIVE

ABNORMALITIES.	N/A	OK	PROBLEM *
Instrumentation		✓	
Procedural		✓	
Sample Collection		✓	
Sample Storage			✓
Sample Preservation		✓	
Containers		✓	
Holding Times		✓	
Other _____			

* If problem or abnormality, explain below

WAS NOT HERE WENT SAMPLES WERE RECIEVED & THEY WERE NOT REFRIGERATED FOR THE HOLDING PERIOD

PROJECT 7488

WOODWARD-CLYDE FEDERAL SERVICES

WCC 22558E/WCFS 4020

TOTAL SUSPENDED SOLIDS ANALYSIS

LAB REPLICATES DATA

Sample No	1st Analysis	2nd Analysis	Mean	Difference as % of Mean
K360-13	178	190	184	6 52
K375-6	0 0	0 0	0 0	0 0

PROJECT 7488

WOODWARD-CLYDE FEDERAL SERVICES

WCC 22558E/WCFS 4020

TOTAL SUSPENDED SOLIDS ANALYSIS

HOLDING TIME SUMMARY

Sample No	Date Received	Date Analyzed	Calculated Holding time
K375 - 1	11/23/90	11/26/90	72 hrs 10 MINUTES
2			
3			
4			
5			
6			

ANALYSIS WORKSHEET

PRIORITY: RUSH
REQ TYPE. NEW REQUEST
LAB GROUP WATER
GRAVIMETRIC
DIG
MTX
CODE 442 EPA 160 2

Calibration: Blanks:

1
10
10^2
10^3
10^4

SOLIDS (SUSPENDED)
11-23-1990 # 9,935 K375/90
WATER
FOR P LYNCH
PROJECT 7488
PRICE 6 @ $ 19 36 EA
TOTAL PRICE $ 116 16

Factor:

Sample Description	#	MATX	EST.	IDEN.	S WT	S.ALIO		GROSS	TARE	NET	Result mg/l
12 CPF 1014				1							<5
-1015				2							<5
-1016				3							6
-1017				4							<5
-1018				5							<5
-1019				6							<10

ENTRY NUMBER 9935
COMPLETE 11 26 1990

Special Instructions: Please identify hazardous sample components:

Due by Mon. 11/26 PM

AREA 7

HAZEN RESEARCH INC.

WATER QUALITY LABORATORY

Analytical Data Form

Parameter: Residue, Non-Filterable (dried @ 103-105 deg C)
Total Suspended Solids (TSS)
Method Reference: EPA-600/4-79-020 method 160.2
Container/Preservative Specification: Plastic/glass
cool to 4 deg C
Analyst DAy Date: 11/26/90

Sample	Aliq (ml)	Crucible	Tare	Gross	mg	mg/l TSS
K375-1	100		24 0659	24 0659	0 0	<5
2			23.5159	23 5159	0.0	<5
3			22 4325	22.4331	0 6	6 0
4			21.6453	21 6457	0.4	4 0
5			23 4552	23 4556	0 4	4 0
6	50		23.4879	23 4879	0 0	<10
26	50		21.6534	21 6534	0.0	<10

Calculation: mg/l TSS = $\frac{(\text{gross-tare}) \times \text{mg} \times 1000}{(\text{aliq})}$

Quality Control:

BALANCE CALIBRATION CHECKS

ATE	ANALYST	TYPE OF BALANCE	ACTUAL WEIGHTS USED, g					COMMENTS
			0.5000	1.0000	50.00	100.00	200.00	
[illegible]	[illegible]	METTLER H34	1.0001	0.4995				
[illegible]	[illegible]	METTLER H34	1.0001	0.5000				
[illegible]	[illegible]	METTLER H34	0.5000	1.0000	50.0002			
[illegible]	[illegible]	[illegible] H34	0.4992	1.0001	50.0001			
[illegible]	[illegible]	METTLER H34	0.5000	1.0001	50.0004			
[illegible]	[illegible]	METTLER [illegible]	0.5003	1.0000	50.0003			
[illegible]	[illegible]	[illegible]	0.4996	1.0000	50.0001			

TEMPERATURE MONITORING OF DRYING OVENS

DATE	ANALYST	TEMP. OF OVEN °C	COMMENTS	TEMP OF OVEN °C	COMMENTS
[illegible]	[illegible]	105		180	
[illegible]	DAY	106	ADJUST TEMP [illegible] 105°C	179	
[illegible]	[illegible]	99	[illegible] TEMP [illegible] °C	186	ADJUSTED TEMP [illegible]
[illegible]	DAY	104		180	
[illegible]	DAY	107	ADJUSTED [illegible] 5°C	185	ADJUSTED TEMP [illegible]
[illegible]	DAY	105		181	
[illegible]	DAY	106		181	

Woodward-Clyde Consultants
Stanford Place 3 Suite 1000 4582 South Ulster Street Parkway
Denver Colorado 80237 (303) 694 2770

Chain of Custody Record

COC #009

PROJECT NO. 22558 TASK 500

SAMPLERS: (Signature) P. Lynch

DATE	TIME	SAMPLE NUMBER	TSS							NUMBER OF CONTAINERS
11/23/90	1045		X							1
	1045		X							1
	1045		X							1
	1045		X							1
	1045		X							1
	1045		X							1

ANALYSES

REMARKS (Sample preservation handling procedures etc.)

For HAZEN

Matrix - Water

~~All samples stored on ice~~ PWL 11/23/90

P.W. Lynch 11/23/90

Contact personnel
Brian Clow or
Peter Lynch x 205

TOTAL NUMBER OF CONTAINERS

RELINQUISHED BY (Signature)	DATE/TIME	RECEIVED BY (Signature)	RELINQUISHED BY (Signature)	DATE/TIME	RECEIVED BY (Signature)
P.W. Lynch	1120 AM			11/23/90 11:20 A	S Jones

METHOD OF SHIPMENT	SHIPPED BY (Signature)	COURIER (Signature)	RECEIVED FOR LAB BY (Signature)	DATE/TIME
			D Yheaulon	11/24/90 8 30AM

HAZEN RESEARCH, INC
ANALYTICAL DEPARTMENT
DATA TRANSMITTAL FORM

PROJECT 7488
CLIENT· WOODWARD-CLYDE FEDERAL SERVICES
CONTRACT WCC 22558E/WCFS 4020

PARAMETER TOTAL SUSPENDED SOLIDS

DATE OF TRANSMITTAL 11-26-90

LAB CONTROL NUMBERS K410-1 thru 6

Documents (check if present)

- ✓ Case Narrative
- ✓ Lab Replicates
- ✓ Holding Time Summary
- ✓ Sample Results Data
- ✓ Oven logbook page(s)
- ✓ Chain of Custody

DATA COMPILER/REVIEWER

PROJECT 7488

WOODWARD-CLYDE FEDERAL SERVICES

WCC 22558E/WCFS 4020

TOTAL SUSPENDED SOLIDS

LAB CONTROL NUMBERS K410-1 thru 6 (13CPF1Ø2Ø thru 13CPF1Ø25)

CASE NARRATIVE

ABNORMALITIES	N/A	OK	PROBLEM *
Instrumentation	___	✓	___
Procedural	___	✓	___
Sample Collection	___	✓	___
Sample Storage	___	✓	___
Sample Preservation	___	✓	___
Containers	___	✓	___
Holding Times	___	✓	___
Other _____	___	___	___

* If problem or abnormality, explain below

PROJECT 7488

WOODWARD-CLYDE FEDERAL SERVICES

WCC 22558E/WCFS 4020

TOTAL SUSPENDED SOLIDS ANALYSIS

LAB REPLICATES DATA

Sample No	1st Analysis	2nd Analysis	Mean	Difference as % of Mean
K360-13	178	190	184	6 52
K375-6	0 0	0 0	0 0	0 0
K410-6	38 0	38 0	0 0	0 0

PROJECT 7488

WOODWARD-CLYDE FEDERAL SERVICES

WCC 22558E/WCFS 4020

TOTAL SUSPENDED SOLIDS ANALYSIS

HOLDING TIME SUMMARY

Sample No	Date Received	Date Analyzed	Calculated Holding time
K410-1	11/26/90	11/27/90	18 hrs 10 minutes
2	↓	↓	↓
3	↓	↓	↓
4	↓	↓	↓
5	↓	↓	↓
6	✓	✓	✓

ANALYSIS WORKSHEET

PRIORITY. RUSH
REQ TYPE NEW REQUEST
LAB GROUP WATER
GRAVIMETRIC
DIG
MTX
CODE 442 EPA 160 2

Calibration: Blanks:

	1
	10
	10^2
	10^3
	10^4

SOLIDS (SUSPENDED)
11-26-1990 # 96 K410/90
WATER
FOR LYNCH
PROJECT 7488
PRICE 6 @ $ 19 36 EA
TOTAL PRICE $ 116 16

Factor:

Sample Description	#	MATX	EST	IDEN	S WT	S ALIQ		GROSS	TARE	NET	Result TSS mg/l
13CPF 1020				1							<5
13CPF 1021				2							<5
13CPF 1022				3							<5
13CPF 1023				4							7
13CPF 1024				5							<5
13CPF 1025				6							38
										R6	38

ENTRY NUMBER 78
COMPLETE 11 28 1990

Special Instructions: Please identify hazardous sample components:

Results By 11/27/90 4:00 PM

AREA 7

HAZEN RESEARCH INC.

WATER QUALITY LABORATORY

Analytical Data Form

Farameter: Residue, Non-Filterable (dried @ 103-105 deg C)
Total Suspended Solids (TSS)
Method Reference: EPA-600/4-79-020 method 160.2
Container/Preservative Specification: Plastic/glass
cool to 4 deg C
Analyst DAY Date: 11/27/90

Sample	Aliq (ml)	Crucible	Tare	Gross	mg	mg/l TSS
K410-1	100		24 0651	24.0651	0 0	<5
2			23.5152	23 5152	0 0	<5
3			22.4318	22.4320	0 2	2.0
4			21 6449	21 6456	0 7	7 0
5			23.4545	23.4545	0 0	0 0
6	50		23.4873	23.4892	1.9	38 0
B6	50		21.6523	21.6542	1.9	38 0

Calculation: mg/l TSS = $\frac{(\text{gross-tare}) \times \text{mg} \times 1000}{(\text{aliq})}$

Quality Control:

TEMPERATURE MONITORING OF DRYING OVENS

DATE	ANALYST	TEMP. OF OVEN °C	COMMENTS	TEMP OF OVEN °C	COMMENTS
[illegible]	[illegible]	105		180	
[illegible]	DAN	106	ADJUST TEMP [illegible] 105°C	179	
[illegible]	[illegible]	99	[illegible] TEMP [illegible] 105°C	186	ADJUSTED TEMP [illegible]
[illegible]	DAN	104		180	
[illegible]	[illegible]	107	ADJUSTED [illegible] 105°C	185	ADJUSTED TEMP [illegible]
[illegible]	DAN	105		181	
[illegible]	DAN	106		181	
[illegible]	[illegible]	106			

BALANCE CALIBRATION CHECKS

DATE	ANALYST	TYPE OF BALANCE	ACTUAL WEIGHTS USED, g					COMMENTS
			0.5000	1.0000	50.00	100.00	200.00	
[illegible]	[illegible]	METTLER H34	1.0001	0.4995				
[illegible]	[illegible]	METTLER H34	1.0001	0.5000				
[illegible]	[illegible]	METTLER H34	0.5000	1.0000	50.0002			
[illegible]	[illegible]	METTLER H34	0.4992	1.0001	50.0001			
[illegible]	[illegible]	METTLER H34	0.5000	1.0001	50.0004			
[illegible]	[illegible]	METTLER [illegible]	0.5003	1.0000	50.0003			
[illegible]	[illegible]	METTLER H34	0.4996	1.0000	50.0001			
[illegible]	[illegible]	METTLER H34	0.4997	1.0000	50.0001			

Woodward-Clyde Consultants
Stanford Place 3 Suite 1000 4582 South Ulster Street Parkway
Denver Colorado 80237 (303) 694 2770

Chain of Custody Record

COC # 010

PROJECT NO: 22558 Task 500

SAMPLERS: (Signature) BK Clow

DATE	TIME	SAMPLE NUMBER	T.S.S.	NUMBER OF CONTAINERS
11/26/90	1600	13CPF1020	X	1
↓	↓	13 CPF 1021	X	1
		13 CPF 1022	X	1
		13 CPF 1023	X	1
		13 CPF 1024	X	1
		13 CPF 1025	X	1

ANALYSES

REMARKS (Sample preservation handling procedures etc.)
For Hazen

Matrix – Water

~~All samples stored on ice.~~ BKC 11/26/90

BK Clow 11/26/90

Contact personnel
Brian Clow or
Peter Lynch
x205

TOTAL NUMBER OF CONTAINERS: 6

RELINQUISHED BY (Signature)	DATE/TIME	RECEIVED BY (Signature)	RELINQUISHED BY (Signature)	DATE/TIME	RECEIVED BY (Signature)
BK Clow	11/26/90 1630	Vicki Hebel 11/26/90 1620	Vicki Hebel	11/27 1355	Sandra Warner

METHOD OF SHIPMENT	SHIPPED BY (Signature)	COURIER (Signature)	RECEIVED FOR LAB BY (Signature)	DATE/TIME

HAZEN RESEARCH, INC
ANALYTICAL DEPARTMENT
DATA TRANSMITTAL FORM

PROJECT 7488
CLIENT. WOODWARD-CLYDE FEDERAL SERVICES
CONTRACT WCC 22558E/WCFS 4020

PARAMETER TOTAL SUSPENDED SOLIDS

DATE OF TRANSMITTAL ~~K423-1 thru 11~~ 11/27/90

LAB CONTROL NUMBERS. K423-1 thru 11

Documents (check if present)

- ✓ Case Narrative
- ✓ Lab Replicates
- ✓ Holding Time Summary
- ✓ Sample Results Data
- ✓ Oven logbook page(s)

DATA COMPILER/REVIEWER

D. Ffrenlon

PROJECT 7488

WOODWARD-CLYDE FEDERAL SERVICES

WCC 22558E/WCFS 4020

TOTAL SUSPENDED SOLIDS

LAB CONTROL NUMBERS K423-1 thru 11 (13CPF1Ø26, 13CPF1Ø27, 14CPF1Ø28 thru 14CPF1Ø-

CASE NARRATIVE

ABNORMALITIES	N/A	OK	PROBLEM *
Instrumentation		✓	
Procedural		✓	
Sample Collection		✓	
Sample Storage		✓	
Sample Preservation		✓	
Containers		✓	
Holding Times		✓	
Other _____			

* If problem or abnormality, explain below

PROJECT 7488

WOODWARD-CLYDE FEDERAL SERVICES

WCC 22558E/WCFS 4020

TOTAL SUSPENDED SOLIDS ANALYSIS

LAB REPLICATES DATA

Sample No	1st Analysis	2nd Analysis	Mean	Difference as % of Mean
K360-13	178	190	184	6 52
K375-6	0 0	0 0	0 0	0 0
K410-6	38 0	38 0	0.0	0 0
K423-11	130 0	~~140 0~~ 138	~~135 0~~ 134	~~7 41~~ 5.97

PROJECT 7488

WOODWARD-CLYDE FEDERAL SERVICES

WCC 22558E/WCFS 4020

TOTAL SUSPENDED SOLIDS ANALYSIS

HOLDING TIME SUMMARY

Sample No	Date Received	Date Analyzed	Calculated Holding time
K423 - 1	11/27/90	11/27/90	0 hrs 10 MINUTES
2			
3			
4			
5			
6			
7			
8			
9			
10			
11			

ANALYSIS WORKSHEET

PRIORITY: RUSH
REQ TYPE NEW REQUEST
LAB GROUP WATER
GRAVIMETRIC
DIG
MTX
CODE 442 EPA 160 2

Calibration:		Blanks:
		1
		10
		10^2
		10^3
		10^4

SOLIDS (SUSPENDED)
11-27-1990 # 136 K423/90
WATER
FOR LYNCH
PROJECT 7488
PRICE 11 @ $ 19 36 EA
TOTAL PRICE $ 212 96

Factor: _____

Sample Description	#	MATX	EST	IDEN	S WT	S ALIQ		GROSS	TARE	NET	Result mg/l
1026				1							66
1027				2						80	~~8~~
1028				3							7
1029				4							6
1030				5							<5
1031				6							7
1032				7							6
1033				8							108
1034				9							93
1035				10							128
1036				11						130	~~135~~
									R11	138	

ENTRY NUMBER 155
COMPLETE 11-28 1990

Special Instructions:

Please identify hazardous sample components:

AREA 7

HAZEN RESEARCH INC.

WATER QUALITY LABORATORY

Analytical Data Form

Farameter: Residue, Non-Filterable (dried @ 103-105 deg C)
Total Suspended Solids (TSS)
Method Reference: EFA-600/4-79-020 method 160.2
Container/Preservative Specification: Plastic/glass
cool to 4 deg C
Analyst DAY Date: 11/27/90

Sample	Aliq (ml)	Crucible	Tare	Gross	mg	mg/l TSS	
K423-1	100		21 7904	21. 7970	6 6	66 0	
2			23. 1123	23. 1203	~~0 8~~ 8.0	~~8 0~~	80.0
3			21 3743	21 3750	0 7	7 0	
4			23 1360	23. 1366	0 6	6.0	
5			23. 4836	23 4840	0.4	4 0	
6			24 2718	24. 2725	0.7	7 0	
7			21. 8241	21. 8247	0 6	6 0	
8			24 5076	24. 5184	10 8	108.0	
9			23. 3333	23. 3426	9 3	93.0	
10			20 8883	20. 9011	12 8	128 0	
11	50		23. 6771	23. 6836	6 5	~~65 0~~	130 0
R11	50		23. 9076	23 9145	~~7 0~~ 6.9	~~140 0~~	138 0

Calculation: mg/l TSS = $\frac{(\text{gross-tare}) \times \text{mg} \times 1000}{(\text{aliq})}$

Quality Control:

TEMPERATURE MONITORING OF DRYING OVENS

DATE	ANALYST	TEMP. OF OVEN °C	COMMENTS	TEMP OF OVEN °C	COMMENTS
[illegible]	[illegible]	105		180	
[illegible]	DAN	106	ADJUST TEMP [illegible] 105°C	179	
[illegible]	[illegible]	99	[illegible] TEMP [illegible] 105°C	186	ADJUSTED TEMP [illegible]
[illegible]	DAN	104		180	
[illegible]	[illegible]	107	ADJUSTED [illegible] 105°C	185	ADJUSTED TEMP [illegible]
[illegible]	DAN	105		181	
[illegible]	DAN	106		181	
[illegible]	DAN	106			

BALANCE CALIBRATION CHECKS

DATE	ANALYST	TYPE OF BALANCE	ACTUAL WEIGHTS USED, g					COMMENTS
			0.5000	1.0000	50.00	100.00	200.00	
[illegible]	[illegible]	METTLER H34	1.0001	0.4995				
[illegible]	[illegible]	METTLER H34	1.0001	0.5000				
[illegible]/90	[illegible]	METTLER H34	0.5000	1.0000	50.0002			
[illegible]/90	[illegible]	[illegible] H34	0.4992	1.0001	50.0001			
[illegible]/90	[illegible]	METTLER H34	0.5000	1.0001	50.0004			
[illegible]	[illegible]	METTLER H34	0.5000	1.0000	50.0003			
[illegible]/90	[illegible]	METTLER H34	0.4996	1.0000	50.0001			
[illegible]/90	[illegible]	METTLER H34	0.4997	1.0000	50.0001			

Woodward-Clyde Consultants
Stanford Place 3 Suite 1000 4582 South Ulster Street Parkway
Denver Colorado 80237 (303) 694 2770

Chain of Custody Record
COC #013

PROJECT NO: 22558 Task 500

SAMPLERS: (Signature)

DATE	TIME	SAMPLE NUMBER	T.S.S.							NUMBER OF CONTAINERS
11/27/90	0930	13CPF1026	X							1
	0930	13CPF1027	X							1
	0930	14CPF1028	X							1
	0930	14CPF1029	X							1
	0800	14CPF1030	X							1
	0930	14CPF1031	X							1
	0930	14CPF1032	X							1
	1115	14CPF1033	X							1
	1115	14CPF1034	X							1
	1115	14CPF1035	X							1
	1115	14CPF1036	X							1

BK Clow 11/27/90

TOTAL NUMBER OF CONTAINERS: 11

REMARKS (Sample preservation handling procedures etc.)
For Hazen

Matrix - Water

~~All samples stored on ice.~~ BK 11/27/90

Contact personnel
Brian Clow or
Peter Lynch
x205

RELINQUISHED BY (Signature)	DATE/TIME	RECEIVED BY (Signature)	RELINQUISHED BY (Signature)	DATE/TIME	RECEIVED BY (Signature)
P.W. Lynch	11/27/90 1140AM	V. Hebel 11/27 1125	V Hebel	11/27 1350	D Sheridan

METHOD OF SHIPMENT	SHIPPED BY (Signature)	COURIER (Signature)	RECEIVED FOR LAB BY (Signature)	DATE/TIME

HAZEN RESEARCH, INC.
ANALYTICAL DEPARTMENT
DATA TRANSMITTAL FORM

PROJECT 7488
CLIENT WOODWARD-CLYDE FEDERAL SERVICES
CONTRACT WCC 22558E/WCFS 4020

PARAMETER TOTAL SUSPENDED SOLIDS

DATE OF TRANSMITTAL 11/29/90

LAB CONTROL NUMBERS: K477-1 thru 9

Documents (check if present)

- ✓ Case Narrative
- ✓ Lab Replicates
- ✓ Holding Time Summary
- ✓ Sample Results Data
- ✓ Oven logbook page(s)
- ✓ Chain of Custody

DATA COMPILER/REVIEWER

D Wheaulon / RB

PROJECT 7488

WOODWARD-CLYDE FEDERAL SERVICES

WCC 22558E/WCFS 4020

TOTAL SUSPENDED SOLIDS

LAB CONTROL NUMBERS L477-1 thru 9 (21CPF1001, 21CPF1002, 21CPF1003, 21CPF1004 21CPF1005, 21CPF1006, 21CPF1007, 21CPF1008, 21CPF1009)

CASE NARRATIVE

ABNORMALITIES.	N/A	OK	PROBLEM *
Instrumentation		✓	
Procedural		✓	
Sample Collection		✓	
Sample Storage		✓	
Sample Preservation		✓	
Containers		✓	
Holding Times		✓	
Other _____			

* If problem or abnormality, explain below

PROJECT 7488

WOODWARD-CLYDE FEDERAL SERVICES

WCC 22558E/WCFS 4020

TOTAL SUSPENDED SOLIDS ANALYSIS

LAB REPLICATES DATA

Sample No	1st Analysis	2nd Analysis	Mean	Difference as % of Mean
K360-13	178	190	184	6.52
K375-6	0.0	0.0	0.0	0.0
K410-6	38.0	38.0	0.0	0.0
K423-11	130.0	140.0	135.0	7.41
K477-9	28.0	28.0	28.0	0.0

PROJECT 7488

WOODWARD-CLYDE FEDERAL SERVICES

WCC 22558E/WCFS 4020

TOTAL SUSPENDED SOLIDS ANALYSIS

HOLDING TIME SUMMARY

Sample No	Date Received	Date Analyzed	Calculated Holding time
K477-1	10/29/90	10/30/90 9 50	18 HRS 20 MINUTES
2			
3			
4			
5			
6			
7			
8			
9			

ANALYSIS WORKSHEET

PRIORITY: RUSH
REQ TYPE NEW REQUEST
LAB GROUP WATER
GRAVIMETRIC
DIG
MTX
CODE 442 EPA 160 2

Calibration: Blanks:

	1
	10
	10^2
	10^3
	10^4

SOLIDS (SUSPENDED)
11-29-1990 # 363 K477/90
WATER
FOR LYNCH
PROJECT 7488
PRICE 9 @ $ 19 36 EA
TOTAL PRICE $ 174 24

Factor:

Sample Description	#	MATX.	EST.	IDEN.	S.WT.	S.ALIQ.		GROSS	TARE	NET	Result mg/l
1001				1							6
2002				2							8
1003				3							17
2004				4							22
1005				5							18
1006				6							21
1007				7							20
1008				8							21
1009				9							28

ENTRY NUMBER 363
COMPLETE 12-03-1990

Special Instructions:

Please identify hazardous sample components:

AREA 7 RESULTS BY 11/30/90 3:00PM

HAZEN RESEARCH INC.

WATER QUALITY LABORATORY

Analytical Data Form

Parameter: Residue, Non-Filterable (dried @ 103-105 deg C)
Total Suspended Solids (TSS)
Method Reference: EPA-600/4-79-020 method 160.2
Container/Preservative Specification: Plastic/glass
cool to 4 deg C
Analyst DAH Date: 11/30/90

Sample	Aliq (ml)	Crucible	Tare	Gross	mg	mg/l TSS
K477-1	100		25.0512	25.0518	0.6	6.0
2			22.9938	22.9946	0.8	8.0
3			22.4074	22.4091	1.7	17.0
4			22.2900	22.2922	2.2	22.0
5			23.2065	23.2083	1.8	18.0
6			23.7393	23.7414	2.1	21.0
7			23.0925	23.0945	2.0	20.0
8			24.2500	24.2521	2.1	21.0
9	50		23.3122	23.3136	1.4	28.0
R9	50		23.4708	23.4722	1.4	28.0

Calculation: mg/l TSS = $\frac{(\text{gross-tare}) \times \text{mg} \quad 1000}{(\text{aliq})}$

Quality Control:

BALANCE CALIBRATION CHECKS

DATE	ANALYST	TYPE OF BALANCE	ACTUAL WEIGHTS USED, g					COMMENTS
			0.5000	1.0000	50.00	100.00	200.00	
9/14/90	DAY	METTLER H34	1.0001	0.4995				
10/22/90	DAY	METTLER H34	1.0001	0.5000				
10/29/90	DAY	METTLER H34	0.5000	1.0000	50.0002			
11/5/90	DAY	METTLER H34	0.4992	1.0001	50.0001			
11/12/90	DAY	METTLER H34	0.5000	1.0001	50.0004			
11/19/90	DAY	METTLER H34	0.5000	1.0000	50.0003			
11/26/90	DAY	METTLER H34	0.4996	1.0000	50.0001			
12/3/90	DAY	METTLER H34	0.4997	1.0000	50.0001			
12/10/90	DAY	METTLER H34	0.5000	1.0001	50.0005			

TEMPERATURE MONITORING OF DRYING OVENS

DATE	ANALYST	TEMP. OF OVEN °C	COMMENTS	TEMP OF OVEN °C	COMMENTS
11/30/90	DPS	106			

Woodward-Clyde Consultants
Stanford Place 3 Suite 1000 4582 South Ulster Street Parkway
Denver Colorado 80237 (303) 694 2770

Chain of Custody Record

COC #017

PROJECT NO. 22558 TASK 500

SAMPLERS: (Signature) P.W Lynch

DATE	TIME	SAMPLE NUMBER	TSS							NUMBER OF CONTAINERS
11/29/90	1330	21 CPF 1001	X							1
	1330	21 CPF 2002	X							1
	1515	21 CPF 1003	X							1
		21 CPF 2004	X							1
		21 CPF 1005	X							1
		21 CPF 1006	X							1
		21 CPF 1007	X							1
		21 CPF 1008	X							1
		21 CPF 1009	X							1

ANALYSES

REMARKS (Sample preservation handling procedures etc.)

For HAZEN

Matrix – WATER

~~All samples stored on ice~~ PWL 11/29/90

P.W. Lynch 11/29/90

Contact personnel
Brian Clow or
Peter Lynch x205

TOTAL NUMBER OF CONTAINERS 9

RELINQUISHED BY (Signature)	DATE/TIME	RECEIVED BY (Signature)	RELINQUISHED BY (Signature)	DATE/TIME	RECEIVED BY (Signature)
Peter W. Lynch	11/29/90 1530PM	V Hetzel 11/29/90 1530		11/29/90 1630	D Cheadon

METHOD OF SHIPMENT	SHIPPED BY (Signature)	COURIER (Signature)	RECEIVED FOR LAB BY (Signature)	DATE/TIME

HAZEN RESEARCH, INC.
ANALYTICAL DEPARTMENT
DATA TRANSMITTAL FORM

PROJECT: 7488
CLIENT: WOODWARD-CLYDE FEDERAL SERVICES
CONTRACT: WCC 22558E/WCFS 4020

PARAMETER TOTAL SUSPENDED SOLIDS

DATE OF TRANSMITTAL 11/29/90

LAB CONTROL NUMBERS: K477-1 thru 9

Documents (check if present):

- ✓ Case Narrative
- ✓ Lab Replicates
- ✓ Holding Time Summary
- ✓ Sample Results Data
- ✓ Oven logbook page(s)
- ✓ Chain of Custody

DATA COMPILER/REVIEWER

D Wheaton / [illegible]

PROJECT 7488

WOODWARD-CLYDE FEDERAL SERVICES

WCC 22558E/WCFS 4020

TOTAL SUSPENDED SOLIDS

LAB CONTROL NUMBERS. L477-1 thru 9 (21CPF1ØØ1, ~~21CPF2ØØ2~~, 21CPF1ØØ3, 21CPF2ØØ
21CPF1ØØ5, 21CPF1ØØ6, 21CPF1ØØ7, 21CPF1ØØ8, 21CPF1ØØ9)

CASE NARRATIVE.

ABNORMALITIES.	N/A	OK	PROBLEM *
Instrumentation		✓	
Procedural		✓	
Sample Collection		✓	
Sample Storage		✓	
Sample Preservation		✓	
Containers		✓	
Holding Times		✓	
Other:_____			

* If problem or abnormality, explain below

PROJECT 7488

WOODWARD-CLYDE FEDERAL SERVICES

WCC 22558E/WCFS 4020

TOTAL SUSPENDED SOLIDS ANALYSIS

LAB REPLICATES DATA

Sample No	1st Analysis	2nd Analysis	Mean	Difference as % of Mean
K360-13	178	190	184	6.52
K375-6	0.0	0.0	0.0	0.0
K410-6	38.0	38.0	0.0	0.0
K423-11	130.0	140.0	135.0	7.41
K477-9	28.0	28.0	28.0	0.0

PROJECT 7488

WOODWARD-CLYDE FEDERAL SERVICES

WCC 22558E/WCFS 4020

TOTAL SUSPENDED SOLIDS ANALYSIS

HOLDING TIME SUMMARY

Sample No	Date Received	Date Analyzed	Calculated Holding time
K477-1	10/29/90	10/30/90 9 50	18 HRS 20 MINUTES
2			
3			
4			
5			
6			
7			
8			
9			

ANALYSIS WORKSHEET

PRIORITY: RUSH
REQ.TYPE. NEW REQUEST
LAB GROUP· WATER
GRAVIMETRIC
DIG
MTX
CODE 442 EPA 160 2

Calibration: Blanks:

	1
	10
	10^2
	10^3
	10^4

SOLIDS (SUSPENDED)
11-29-1990 # 363 K477/90
WATER
FOR LYNCH
PROJECT 7488
PRICE· 9 @ $ 19 36 EA.
TOTAL PRICE· $ 174 24

Factor:_____

Sample Description	#	MATX.	EST.	IDEN.	S.WT.	S.ALIQ.		GROSS	TARE	NET	Result mg/l
1001				1							6
2002				2							8
1003				3							17
2004				4							22
1005				5							18
1006				6							21
1007				7							20
1008				8							21
1009				9							28

Special Instructions: Please identify hazardous sample components:

AREA 7 RESULTS BY· 11/30/90 3 00PM

HAZEN RESEARCH INC.

WATER QUALITY LABORATORY

Analytical Data Form

Farameter: Residue, Non-Filterable (dried @ 103-105 deg C)
Total Suspended Solids (TSS)
Method Reference: EPA-600/4-79-020 method 160.2
Container/Preservative Specification: Plastic/glass
cool to 4 deg C
Analyst DAY Date: 11/30/90

Sample	Aliq (ml)	Crucible	Tare	Gross	mg	mg/l TSS
K477-1	100		25.0512	25.0518	0.6	6.0
2			22.9938	22.9946	0.8	8.0
3			22.4074	22.4091	1.7	17.0
4			22.2900	22.2922	2.2	22.0
5			23.2065	23.2083	1.8	18.0
6			23.7393	23.7414	2.1	21.0
7			23.0925	23.0945	2.0	20.0
8			24.2500	24.2521	2.1	21.0
9	50		23.3122	23.3136	1.4	28.0
R9	50		23.4708	23.4722	1.4	28.0

Calculation: $mg/l\ TSS = \frac{(gross-tare) \times mg \times 1000}{(aliq)}$

Quality Control:

BALANCE CALIBRATION CHECKS

DATE	ANALYST	TYPE OF BALANCE	ACTUAL WEIGHTS USED, g					COMMENTS
			0.5000	1.0000	50.00	100.00	200.00	
10/16/90	DDA	METTLER H34	1.0001	0.4995				
10/22/90	DAA	METTLER H34	1.0001	0.5000				
10/29/90	DAA	METTLER H34	0.5000	1.0000	50.0002			
11/5/90	DDA	METTLER H34	0.4992	1.0001	50.0001			
11/12/90	DAA	METTLER H34	0.5000	1.0001	50.0004			
11/19/90	DAA	METTLER H34	0.5000	1.0000	50.0003			
11/26/90	DAA	METTLER H34	0.4996	1.0000	50.0001			
12/3/90	DAA	METTLER H34	0.4997	1.0000	50.0001			
12/10/90	DAA	METTLER H34	0.5000	1.0001	50.0005			

TEMPERATURE MONITORING OF DRYING OVENS

DATE	ANALYST	TEMP. OF OVEN °C	COMMENTS	TEMP OF OVEN °C	COMMENTS
11/30/90	DPSX	106			

Woodward-Clyde Consultants

Stanford Place 3 Suite 1000 4582 South Ulster Street Parkway
Denver Colorado 80237 (303) 694 2770

Chain of Custody Record

COC #017

PROJECT NO. 22558 TASK 500

SAMPLERS: (Signature) P.W Lynch

DATE	TIME	SAMPLE NUMBER	TSS							NUMBER OF CONTAINERS
11/29/90	1330	21 CPF 1001	X							1
	1330	21 CPF 2002	X							1
	1515	21 CPF 1003	X							1
		21 CPF 2004	X							1
		21 CPF 1005	X							1
		21 CPF 1006	X							1
		21 CPF 1007	X							1
		21 CPF 1008	X							1
		21 CPF 1009	X							1

ANALYSES

REMARKS (Sample preservation handling procedures etc.)

For HAZEN

Matrix - WATER

~~All samples stored on ice~~ PWL 11/29/90

Contact personnel
Brian Clow or
Peter Lynch x205

P.W. Lynch 11/29/90

TOTAL NUMBER OF CONTAINERS 9

RELINQUISHED BY (Signature)	DATE/TIME	RECEIVED BY (Signature)	RELINQUISHED BY (Signature)	DATE/TIME	RECEIVED BY (Signature)
Peter W. Lynch	11/29/90 1530PM	N Hetsel 11/29/90 1530		11/29/90 1630	D Gheanlon

METHOD OF SHIPMENT	SHIPPED BY (Signature)	COURIER (Signature)	RECEIVED FOR LAB BY (Signature)	DATE/TIME

HAZEN RESEARCH, INC
ANALYTICAL DEPARTMENT
DATA TRANSMITTAL FORM

PROJECT 7488
CLIENT WOODWARD-CLYDE FEDERAL SERVICES
CONTRACT WCC 22558E/WCFS 4020

PARAMETER TOTAL SUSPENDED SOLIDS

DATE OF TRANSMITTAL 11/30/90

LAB CONTROL NUMBERS K493-1 thru 13

Documents (check if present)

- ✓ Case Narrative
- ✓ Lab Replicates
- ✓ Holding Time Summary
- ✓ Sample Results Data
- ✓ Oven logbook page(s)
- ✓ Chain of Custody

DATA COMPILER/REVIEWER

D. Wheaton / [illegible]

PROJECT 7488

WOODWARD-CLYDE FEDERAL SERVICES

WCC 22558E/WCFS 4020

TOTAL SUSPENDED SOLIDS

LAB CONTROL NUMBERS K493-1 thru 13 (22CPF1Ø10 thru 22CPF1Ø15 & 24CPF1Ø16 thru 24CPF1Ø22)

CASE NARRATIVE

ABNORMALITIES	N/A	OK	PROBLEM *
Instrumentation		✓	
Procedural		✓	
Sample Collection		✓	
Sample Storage		✓	
Sample Preservation		✓	
Containers		✓	
Holding Times		✓	
Other _____			

* If problem or abnormality, explain below

PROJECT 7488

WOODWARD-CLYDE FEDERAL SERVICES

WCC 22558E/WCFS 4020

TOTAL SUSPENDED SOLIDS ANALYSIS

LAB REPLICATES DATA

Sample No	1st Analysis	2nd Analysis	Mean	Difference as % of Mean
K360-13	178	190	184	6 52
K375-6	0 0	0 0	0 0	0 0
K410-6	38 0	38 0	0.0	0 0
K423-11	130 0	140 0	135 0	7 41
K477-9	28 0	28 0	28 c	0 0
K493-13	84 0	96 0	90 0	13 3

PROJECT 7488

WOODWARD-CLYDE FEDERAL SERVICES

WCC 22558E/WCFS 4020

TOTAL SUSPENDED SOLIDS ANALYSIS

HOLDING TIME SUMMARY

Sample No	Date Received	Date Analyzed	Calculated Holding time
K493-1	11/30/90 11:50	11/30/90 12:30	0 hrs 40 MINUTES
2			
3			
4			
5			
6			
7			
8			
9			
10			
11			
12			
13			

ANALYSIS WORKSHEET

PRIORITY RUSH
REQ TYPE NEW REQUEST
LAB GROUP WATER
GRAVIMETRIC
DIG
MTX
CODE 442 EPA 160 2

Calibration:		Blanks:
		1
		10
		10^2
		10^3
		10^4

SOLIDS (SUSPENDED)
11-30-1990 # 424 K493/90
WATER
FOR LYNCH
PROJECT 7488
PRICE 13 @ $ 19 36 EA
TOTAL PRICE $ 251 68

Factor:_____

Sample Description	#	MATX	EST	IDEN	S WT	S ALIQ		GROSS	TARE	NET	Result mg/l
1010				1							<5
1011				2							6
1012				3							<5
1013				4							<5
1014				5							<5
1015				6							122
1016				7							<5
1017				8							6
1018				9							<5
1019				10							<5
1020				11							<5
1021				12							<5
1022				13							90

ENTRY NUMBER 4 4
COMPLETE 12 3 1990

Special Instructions:

Please identify hazardous sample components:

AREA 7 RESULTS BY 11/31/90 1200

HAZEN RESEARCH INC.

WATER QUALITY LABORATORY

Analytical Data Form

Parameter: Residue, Non-Filterable (dried @ 103-105 deg C)
Total Suspended Solids (TSS)
Method Reference: EPA-600/4-79-020 method 160.2
Container/Preservative Specification: Plastic/glass
cool to 4 deg C
Analyst DAY Date: 11/30/90

Sample	Aliq (ml)	Crucible	Tare	Gross	mg	mg/l TSS
K493-1	100		21.3379	21.3382	0.3	3.0
2			21.6458	21.6464	0.6	6.0
3			23.4090	23.4094	0.4	4.0
4			24.6383	24.6386	0.3	3.0
5			21.7909	21.7912	0.3	3.0
6			23.1128	23.1250	12.2	122.0
7			21.3762	21.3765	0.3	3.0
8			23.1369	23.1375	0.6	6.0
9			23.4843	23.4848	0.3	3.0
10			24.2731	24.2735	0.4	4.0
11			21.8253	21.8256	0.3	3.0
12			24.5087	24.5090	0.3	3.0
13	50		23.3351	23.3393	4.2	84.0) 90
R13	50		23.6784	23.6832	4.8	96.0

Calculation: $mg/l\ TSS = \frac{(gross-tare) \times mg \times 1000}{(aliq)}$

Quality Control:

TEMPERATURE MONITORING OF DRYING OVENS

DATE	ANALYST	TEMP. OF OVEN °C	COMMENTS	TEMP OF OVEN °C	COMMENTS
11/30/10	DHX	106			

BALANCE CALIBRATION CHECKS

DATE	ANALYST	TYPE OF BALANCE	ACTUAL WEIGHTS USED, g					COMMENTS
			0.5000	1.0000	50.00	100.00	200.00	
1/10/90	DDA	METTLER H34	1.0001	0.4995				
2/2/9	DAG	METTLER H34	1.0001	0.5000				
4/90	DAG	METTLER H34	0.5000	1.0000	50.0002			
1/90	DAG	METTLER H34	0.4992	1.0001	50.0001			
/90	DAG	METTLER H34	0.5000	1.0001	50.0004			
/90	DAG	METTLER H34	0.5000	1.0000	50.0003			
	DAG	METTLER H34	0.4996	1.0000	50.0001			
/90	DAG	METTLER H34	0.4997	1.0000	50.0001			
/90	DAG	METTLER H34	0.5000	1.0001	50.0005			11/29/90 QA BALANCE SERVICE REP CHECK BALANCES

Woodward-Clyde Consultants
Stanford Place 3 Suite 1000 4582 South Ulster Street Parkway
Denver Colorado 80237 (303) 694 2770

Chain of Custody Record

COC # 018

PROJECT NO. 22558 TASK 500

SAMPLERS: (Signature) P.W. Lynch

DATE	TIME	SAMPLE NUMBER	TSS							NUMBER OF CONTAINERS
11/30/90	0915	22CPF1010	X							1
		22CPF1011	X							1
		22CPF1012	X							1
		22CPF1013	X							1
		22CPF1014	X							1
		22CPF1015	X							1
	1010	24CPF1016	X							1
	1115	24CPF1017	X							1
		24CPF1018	X							1
		24CPF1019	X							1
		24CPF1020	X							1
		24CPF1021	X							1
		24CPF1022	X							1

ANALYSES

REMARKS (Sample preservation handling procedures etc.)
For Hazen

Matrix - Water

~~All samples stored on ice.~~
BRC 11/30/90

B Claw 11/30/90

Contact personnel
Brian Claw or
Peter Lynch
x205

TOTAL NUMBER OF CONTAINERS 13

RELINQUISHED BY (Signature)	DATE/TIME	RECEIVED BY (Signature)	RELINQUISHED BY (Signature)	DATE/TIME	RECEIVED BY (Signature)
P.W. Lynch	11/30/90 1130 AM	Hebel 11/30/90 1150		11/30/90 12:30	D Theaulon

METHOD OF SHIPMENT	SHIPPED BY (Signature)	COURIER (Signature)	RECEIVED FOR LAB BY (Signature)	DATE/TIME

HAZEN RESEARCH, INC
ANALYTICAL DEPARTMENT
DATA TRANSMITTAL FORM

PROJECT 7488
CLIENT WOODWARD-CLYDE FEDERAL SERVICES
CONTRACT WCC 22558E/WCFS 4020

PARAMETER pH

DATE OF TRANSMITTAL 11/15/90

LAB CONTROL NUMBERS K232-1 thru 6

Documents (check if present)

- ✓ Case Narrative ✓
- ✓ Lab Replicates ✓
- ✓ Holding Time Summary ✓
- ✓ Sample Results Data ✓
- ✓ pH meter logbook page(s) ✓
- ✓ Control Chart(s) ✓
- ✓ Chain of Custody ✓

DATA COMPILER/REVIEWER

D Yheanlon / [illegible]

PROJECT 7488

WOODWARD-CLYDE FEDERAL SERVICES

WCC 22558E/WCFS 4020

pH

LAB CONTROL NUMBERS Ø1GA01ØØ2, Ø2GA01ØØ3, Ø3GA01ØØ4, Ø4GA01ØØ5, Ø5GA01ØØ6, Ø1GA01ØØ1

CASE NARRATIVE

ABNORMALITIES	N/A	OK	PROBLEM *
Instrumentation		✓	
Procedural		✓	
Sample Collection		✓	
Sample Storage		✓	
Sample Preservation		✓	
Containers		✓	
Holding Times		✓ *	
Other _____			

* If problem or abnormality, explain below

* Analysis performed within 24 hrs per contract requirement. [illegible]

PROJECT 7488

WOODWARD-CLYDE FEDERAL SERVICES

WCC 22558E/WCFS 4020

pH ANALYSIS

LAB REPLICATES DATA

Sample No	1st Analysis	2nd Analysis	Mean	Difference as % of Mean
K232-6	7 653	7 677	7 665	0 31

PROJECT 7488

WOODWARD-CLYDE FEDERAL SERVICES

WCC 22558E/WCFS 4020

pH ANALYSIS

HOLDING TIME SUMMARY

Sample No	Date Received	Date Analyzed	Calculated Holding time
K232-1	11-14-90 4:20pm	11-15-90 9:30am	17 hrs 10 min
2			
3			
4			
5			
6			

ANALYSIS WORKSHEET

PRIORITY: RUSH
REQ.TYPE: NEW REQUEST
LAB GROUP: WATER
PH METER
DIG
MTX
CODE 440 EPA 150.1

Calibration: Blanks:

1
10
10^2
10^3
10^4

pH
11-14-1990 # 9,282 K232/90
WATER
FOR LYNCH
PROJECT 7488
PRICE· 6 @ $ 18.48 EA
TOTAL PRICE. $ 110.88

Factor:

Sample Description	#	MATX.	EST.	IDEN.	RDG.	PPM	WT.	ALIQ.	DIL.1	DIL.2	Result
01GA01002				1							8.61
02GA01003				2							8.37
03GA01004				3							8.37
04GA01005				4							8.27
05GA01006				5							8.32
01GA01001				6							7.67

ENTRY NUMBER 028-
COMPLETE 11-15-1990

Special Instructions: Please identify hazardous sample components:

AREA 7 H2O AREA 5 RAD TOTAL BASIS DUE BY: 11-15-90 4PM

HAZEN RESEARCH INC.

WATER QUALITY LABORATORY

Analytical Data Form

Parameter: pH (Electrometric)
Method Reference: EPA-600/4-79-20 method 150.1
Container/Preservative Specification: Plastic/Glass
Cool to 4 deg. C
Analyst DAY Date: 11/15/90

Sample	Calibration pH4	pH7	pH10	Sample pH
K232-1	✓	✓		8.602
2				8.387
3				8.303
4				8.237
5				8.312
6				7.580
R6				7.625
pH STD				6.215
K232-1		✓	✓	8.611
2				8.373
3				8.368
4				8.236
5				8.316
6				7.653
R6				7.677
WS787				7.337

Instrument used: ALTEX #1

pH STD (5.850) 5.435 – 6.435
WS 987 (7.30) 7.15 – 7.39

CHANGED pH BUFFERS 10/15/90 DAY

PH CALIBRATION LOG

E/ANALYST	ALTEX #1 4	7	10	ALTEX #2 4	7	10	COMMENTS
11/15/90 Day	4 073	7 087	10 073				#2 REPAIRED 11/ NOT CALIBRATED

Date	Value
11/15/90	6 215
11/12/90	6 068
11/1/90	6 233
10/24/90	6 243
10/4/90	6.140
10/1/90	5 981
9/25/90	5 978
9/19/90	6.023
9/13/90	5 990
9/11/90	6.141

Standard:

Element:

pH

Method.

ELECTRODE

$\bar{X}$ =

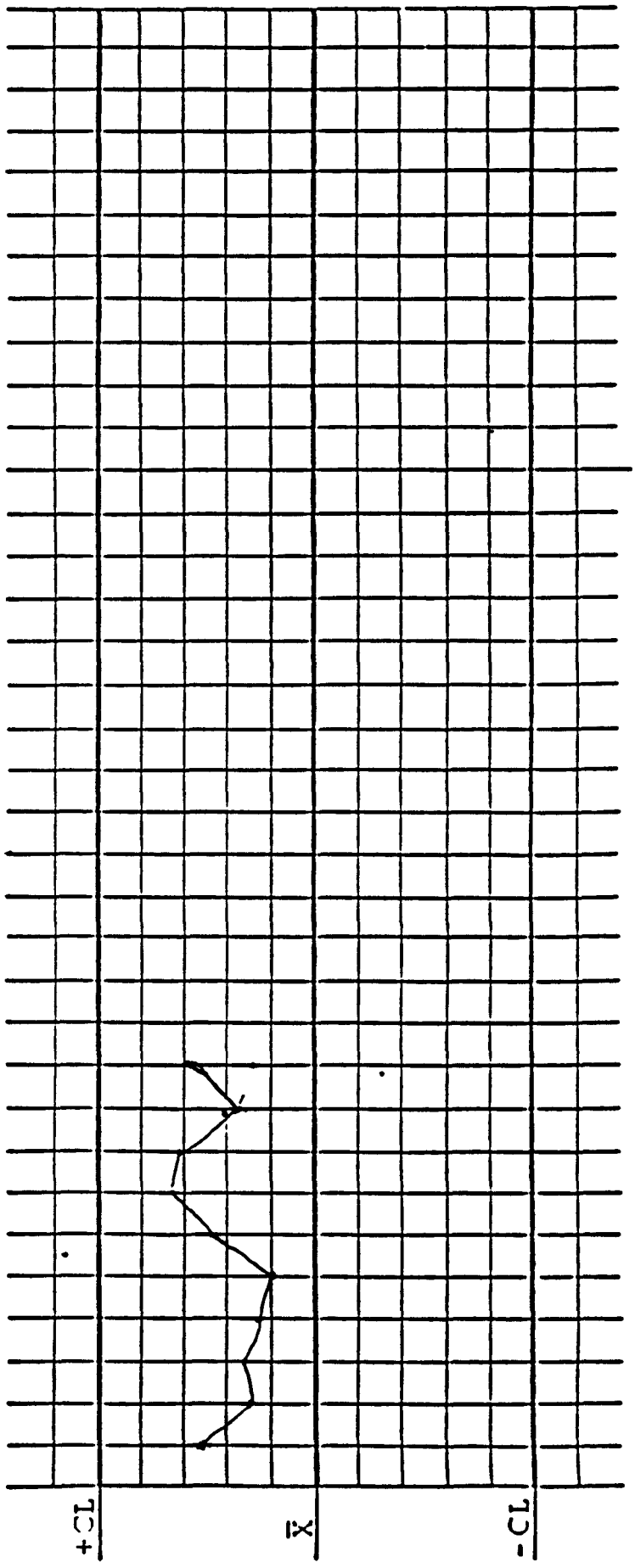
5.850

+CL=

6.435

−CL =

5 435



CONTROL CHART - WATER ANALYSIS

Date	Value
11/15/90	7.337

Standard: WS787

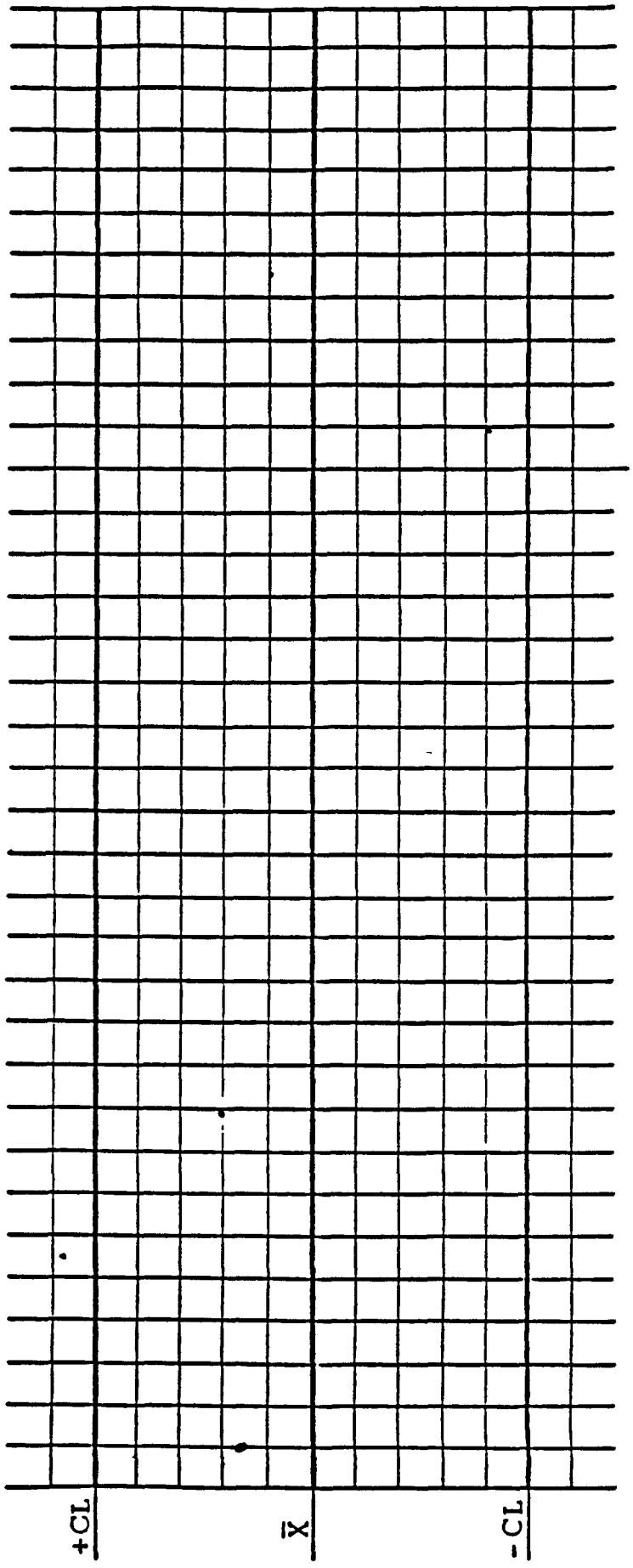
Element: pH

Method. ELECTRODE

$\bar{X}$= 7.30

-CL= 7.15

+CL = 7.39



Woodward-Clyde Consultants
Stanford Place 3 Suite 1000 4582 South Ulster Street Parkway
Denver Colorado 80237 (303) 694 2770

Chain of Custody Record

COC # 004

PROJECT NO. 22558 Task 500

SAMPLERS (Signature) BR Clow

DATE	TIME	SAMPLE NUMBER	ANALYSES: DH	ANALYSES: Gross α, β	NUMBER OF CONTAINERS
11/14/90	1545	01GA01002	X		1
	1545	02GA01003	X		1
	1545	03GA01004	X		1
	1545	04GA01005	X		1
	1545	05GA01006	X		1
	1115	01GA01001	X		1
	1600	02CWC01001		X	1
	1600	02CWC01002		X	1

BR Clow 11/14/90

TOTAL NUMBER OF CONTAINERS: 8

REMARKS (Sample preservation handling procedures etc.)

For Hazen Research

Matrix – Water

~~All samples stored on ice~~ BRC 11/14/90

– 24-hour Turnaround

Contact personnel
Brian Clow or Peter Finch x205

RELINQUISHED BY (Signature)	DATE/TIME	RECEIVED BY (Signature)	RELINQUISHED BY (Signature)	DATE/TIME	RECEIVED BY (Signature)
BR Clow	11/14/90 1620	Vicki Hebel	V. Hebel	11/15 0800	Deborah A. Zhendon

METHOD OF SHIPMENT	SHIPPED BY (Signature)	COURIER (Signature)	RECEIVED FOR LAB BY (Signature)	DATE/TIME
Personal Delivery				

Thermo Analytical, Inc.
Water Quality Parameters
CWC Samples, CPF Round 3 Samples, and GAO Round 2 Samples

TMA
Thermo Analytical Inc.

TMA/Norcal
2030 Wright Avenue
P O Box 4040
Richmond CA 94804-0040
(415) 235-2633 Fax No (415) 235-0438

RECEIVED
FEB 1 1 1991
WCC/DENVER, COLORADO

February 7, 1991

Woodward Clyde Consultant
4582 S Ulster St Parkway
Denver, CO 80237

Attention Steve Baca

Reference TMA/Norcal N0-11-188
Woodward Clyde Project Number 22558

Dear Mr Baca

Enclosed are the results for the wet chemical analysis of one water sample received on November 29, 1990

Please do not hesitate to call me if you have any questions

Sincerely,

Daniel H Stuermer, Ph D
Program Manager

DHS/dss

Enclosures

RECEIVED
FEB 1 1 1991
WCC/DENVER, COLORADO

Scientific Services Since 1922

ENVIRONMENTAL
CHEMICAL ■ PHYSICAL
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prepared for

TMA/NORCAL

Work Order #9011263

TMA
Thermo Analytical Inc.

Skinner & Sherman Laboratories Inc

300 Second Avenue P O Box 521, Waltham Massachusetts 02254-0521 (617) 890-7200
1-800-4 LAB TEST FAX (617) 890-3883

 Skinner&Sherman REPORT Work Order # 90-11-263

Received: 11/29/90 02/06/91 15.01:34

REPORT TMA/NORCAL
TO 2030 Wright Avenue
Richmond, CA 94804

ATTEN Dan Steurmer

CLIENT WOODWARD NOR SAMPLES 1
COMPANY TMA/NORCAL
FACILITY Richmond, CA

PREPARED TMA / Skinner & Sherman Labs.
BY 300 Second Avenue
P.O. Box 521
Waltham, MA 02254
ATTEN Client Services
PHONE (617) 890-7200

CERTIFIED BY

CONTACT DP

WORK ID Woodward Clyde COC #016
TAKEN By Client
TRANS Fedex
TYPE Mixed Wastes
P O #
INVOICE under separate cover

SAMPLE IDENTIFICATION

01 03CWC1005

TEST CODES and NAMES used on this workorder

CL W	Chloride - Aqueous
CO3 W	CARBONATE
F W	Fluoride - Aqueous
NO3NO2	Nitrate Plus Nitrite
PH W	pH - Aqueous
SO4 W	Sulfate - Aqueous
S COND	Specific Conductance
TDS	Total Dissolved Solids
TSS	Total Suspended Solids

This report is rendered upon all of the following conditions Skinner & Sherman Laboratories, Inc. retains ownership of this report until associated submitted invoice is satisfied Expert witness services shall be available in conjunction with this report only if prior notification of this potential requirement was made and accepted, before the analysis Client will be responsible for Skinner & Sherman costs and consulting fees if our services are required by subpoena or otherwise in legal proceedings. Total liability is limited to the invoice amount The results listed refer only to tested samples and applicable parameters. Product endorsement is neither inferred nor implied. Skinner & Sherman Laboratories Inc. will exercise due diligence but will not be responsible for lost or destroyed samples or evidence unless client makes appropriate insurance coverage arrangements. Samples are held for thirty days following issuance of report Samples will be stored at client s expense, if authorized in writing.

TMA
Thermo Analytical Inc.
Skinner & Sherman Laboratories Inc. 300 Second Avenue, P O Box 521, Waltham, Massachusetts 02254-0521 (617) 890-7200
1-800-4 LAB TEST FAX (617) 890-3883

Received: 11/29/90 Results by Sample

SAMPLE ID 03CWC1005 SAMPLE # 01 FRACTIONS B,C

Date & Time Collected 11/28/90 Category WATER

CL_W 56.2 mg/L	CO3_W 392 mg CaCO3/L	F_W 1.16 mg/L	NO3NO2 4.15 mg N/L	PH_W 7.60 pH units	SO4_W 51 4 mg/L
S_COND 791 micromhos	TDS 545 mg/L	TSS <3.33 mg/L			

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Skinner & Sherman Laboratories Inc. 300 Second Avenue, P O Box 521, Waltham, Massachusetts 02254-0521 (617) 890-7200
1-800-4 LAB TEST FAX (617) 890-3883

TMA/NORCAL

QUALITY CONTROL

CHLORIDE

MATRIX SPIKE

Sample ID	Sample Result	Spike Added	Spike Result	% Recovery
9011263-01	(1·1) 56 2 mg/L	25 0 mg/L	52 6 mg/L	98.0

DUPLICATE

Sample ID	Sample Result	Duplicate Result	Relative % Difference
9011263-01	56.2 mg/L	55.5 mg/L	1.25

QUALITY CONTROL SAMPLES

Sample ID	True Value	Found Value	% Recovery
LCS	52 1 mg/L	50 8 mg/L	97 5
Blank		<5.0 mg/L	

CARBONATE

DUPLICATE

Sample ID	Sample Result	Duplicate Result	Relative % Difference
9011176-08	385 mg/L	386 mg/L	0 3

QUALITY CONTROL SAMPLES

Sample ID	True Value	Found Value	% Recovery
LCS	27 3 mg/L	24 5 mg/L	89 7

FLUORIDE

MATRIX SPIKE

Sample ID	Sample Result	Spike Added	Spike Result	% Recovery
9011263-01	1 2 mg/L	2 0 mg/L	3 2 mg/L	100 0

DUPLICATE

Sample ID	Sample Result	Duplicate Result	Relative % Difference
9011263-01	1 2 mg/L	1 1 mg/L	8 7

QUALITY CONTROL SAMPLES

Sample ID	True Value	Found Value	% Recovery
LCS	1.0 mg/L	1.0 mg/L	100 0
Blank		<1 0 mg/L	

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Skinner & Sherman Laboratories Inc. 300 Second Avenue, P O Box 521, Waltham, Massachusetts 02254-0521 (617) 890-7200
1-800-4 LAB TEST FAX (617) 890-3883

TMA/NORCAL

SULFATES

MATRIX SPIKE

Sample ID	Sample Result	Spike Added	Spike Result	% Recovery
9012286-24	44 8 mg/L	40 mg/L	83 6 mg/L	97 0

DUPLICATE

Sample ID	Sample Result	Duplicate Result	Relative % Difference
9012286-24	44 8 mg/L	44.4 mg/L	0 9

QUALITY CONTROL SAMPLES

Sample ID	True Value	Found Value	% Recovery
LCS	20 0 mg/L	18 5 mg/L	92 5
Blank		<5 0 mg/L	

SPECIFIC CONDUCTIVITY

DUPLICATE

Sample ID	Sample Result	Duplicate Result	Relative % Difference
9011176-08	780	780	0

QUALITY CONTROL SAMPLES

Sample ID	True Value	Found	% Recovery
LCS	267	252	94 4

TOTAL SUSPENDED SOLIDS

DUPLICATE

Sample ID	Sample Result	Duplicate Result	Relative % Difference
9011263-01	<3 33	<3 33	not calculable

TOTAL DISSOLVED SOLIDS

DUPLICATE

Sample ID	Sample Result	Duplicate Result	Relative % Difference
9011263-01	545 mg/L	585 mg/L	7 1

NITRATE/NITRITE

MATRIX SPIKE

Sample ID	Sample Result	Spike Added	Spike Result	% Recovery

TMA
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1-800-4 LAB TEST FAX (617) 890-3883

TMA/NORCAL

9011263-01	(1:1) 4 15 mg/L	1 55 mg/L	3.75 mg/L	108 1

DUPLICATE

Sample ID	Sample Result	Duplicate Result	Relative % Difference
9011262-01	4 15 mg/L	4 19 mg/L	1 0

QUALITY CONTROL SAMPLES

Sample ID	True Value	Found Value	% Recovery
LCS	2.00 mg/L	2 01 mg/L	100 5
Blank		<0 25 mg/L	

TMA
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Skinner & Sherman Laboratories Inc. 300 Second Avenue, P O Box 521, Waltham, Massachusetts 02254-0521 (617) 890-7200
1-800-4 LAB TEST FAX (617) 890-3883

Received: 11/29/90 Test Methodology

TEST CODE CL W NAME Chloride - Aqueous

Standard Methods for Chemical Analysis of Water and Wastes
EPA - 600/4-79-020, March 1979, Method 325 2.

TEST CODE CO3 W NAME CARBONATE

Standard Methods for the Examination of Water and Wastewater (16th Edition, 1985), Method 403.

TEST CODE F W NAME Fluoride - Aqueous

Method for Chemical Analysis of Water and Wastes EPA-600/4-79-020, March 1983
Method 340 2

TEST CODE NO3NO2 NAME Nitrate Plus Nitrite

Methods for Chemical Analysis of Water and Wastes
EPA - 600/4-79-020 March 1979 Method 353 1

TEST CODE PH W NAME pH - Aqueous

Standard Methods for the Examination of Water and Wastewater,
(16th Edition, 1985), Method 423

TEST CODE SO4 W NAME Sulfate - Aqueous

Standard Methods for the Examination of Water and Wastewater
(16th Edition) Method 426C

TEST CODE S COND NAME Specific Conductance

Standard Methods for the Examination of Water and Wastewater,
(16th Edition, 1985), Method 205

TEST CODE TDS NAME Total Dissolved Solids

Standard Methods for the Examination of Water and Wastewater,
(16th Edition, 1985) Method 209B

TEST CODE TSS NAME Total Suspended Solids

Standard Methods for the Examination of Water and Wastewater
(16th Edition, 1985), Method 209C

TMA
Thermo Analytical Inc.

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Skinner & Sherman Laboratories Inc. 300 Second Avenue, P O Box 521, Waltham, Massachusetts 02254-0521 (617) 890-7200
1-800-4 LAB TEST FAX (617) 890-3883

SKINNER & SHERMAN LABORATORIES

TRAACS 800 SYSTEM BENCH SHEET
GENERAL ANALYSIS

DATE: 1/21/91
ANALYST: [illegible]
METHOD:

NO_3/NO_2

RUN ID'S		WORKORDER
91021	- 04	901263
	-	
	-	
	-	
	-	
	-	

STANDARDS:	NAME	SOURCE	PREPARED
ICV	WP9E4		
CCV	1.34 ppm		
ICB/CCB			

POS	LAB ID	SAMPLE ID	COMMENTS
01	Prep		
02	0.62 ppm		
03	1.24		
04	2.48		
05	3.1		
06	3.1		
07	0.62		
08	0.62		
09	ICV		
10	ICB		
11	PD		
12	901263-01	(3x)	
13	DID	(3x)	
14	DS	(3x)	
15	Blank		
16	CCV		
17	CCB		
18			
19			
20			
21			
22			
23			
24			
25			
26			
27			
28			
29			
30			
31			
32			
33			
34			
35			

Spike =
1ml sample
Plus 1ml 3.1 ppm
Thus 1.55 ppm

(9)

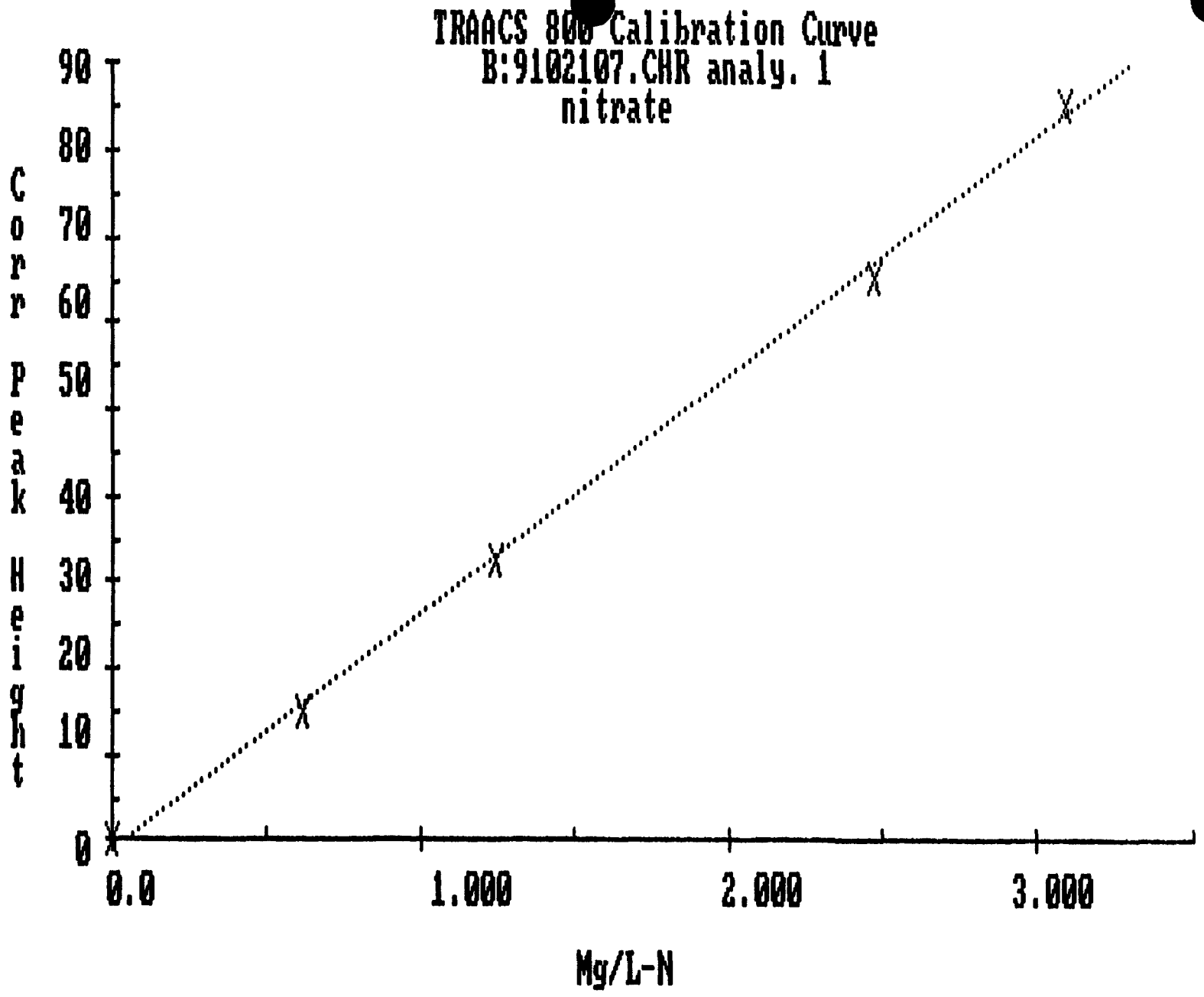
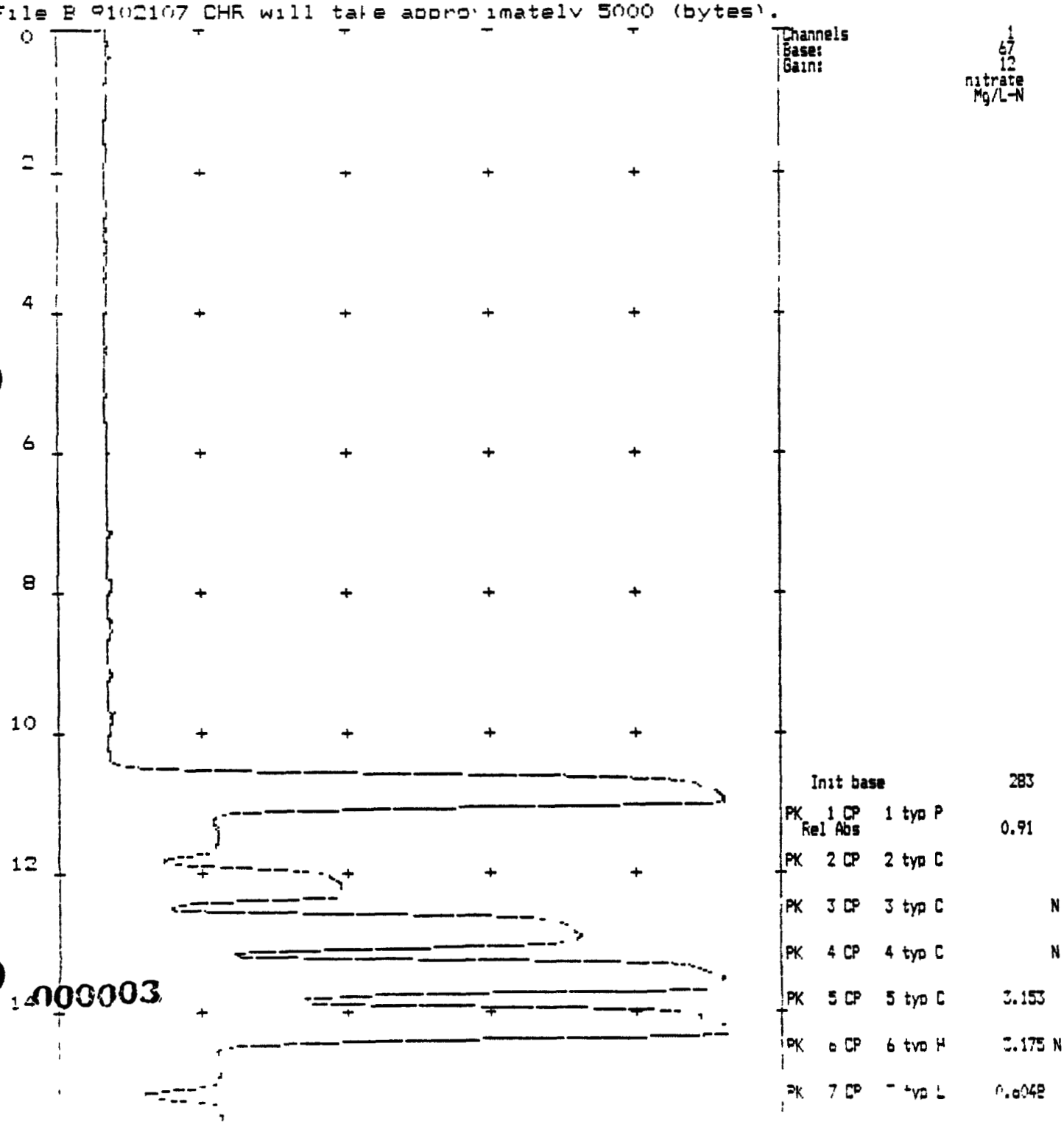

TRAACS 800 Calibration Curve
B:9102107.CHR analy. 1
nitrate
Corr Peak Height
90
80
70
60
50
40
30
20
10
0
0.0
1.000
2.000
3.000
Mg/L-N

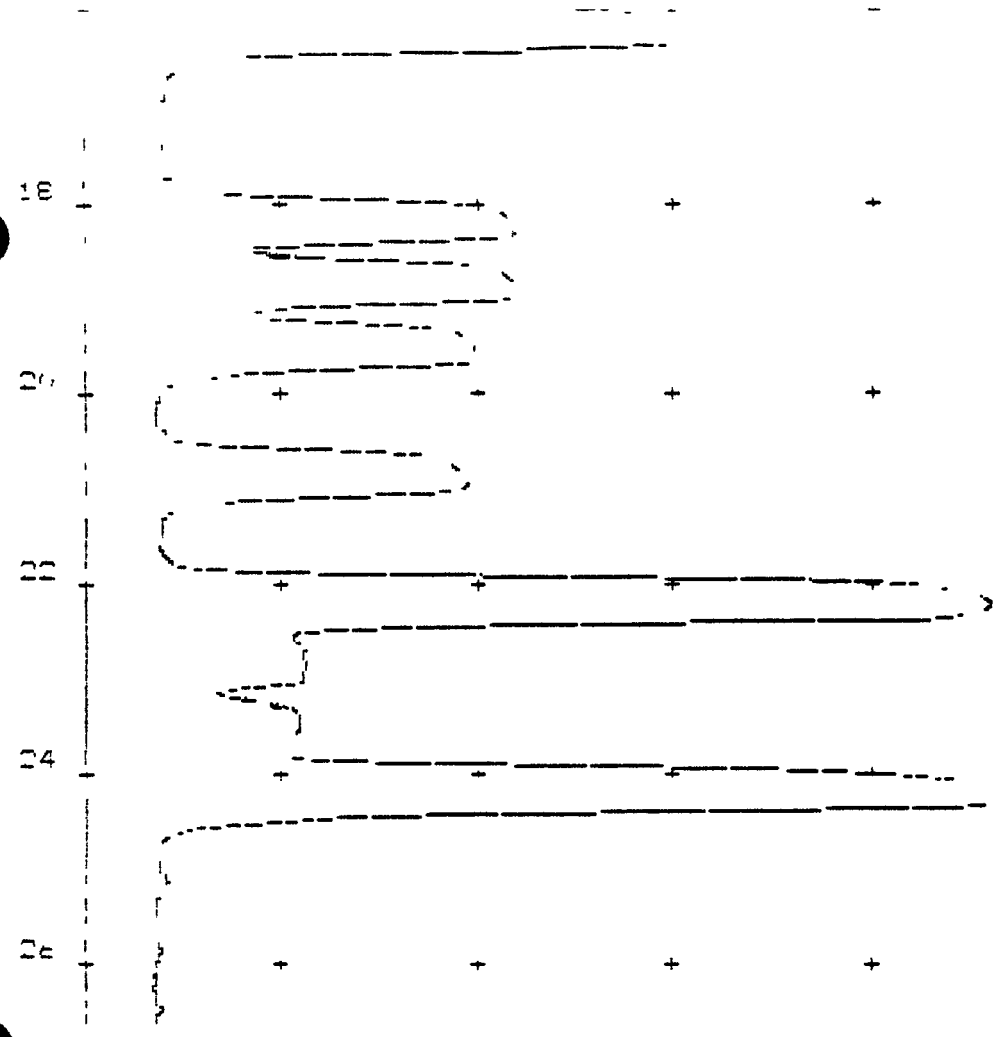
Chart minimum [illegible] maximum [illegible]
Active spectrum 1

Input Filename B NIT INF
Time [illegible] PM, Date [illegible]-21-91
Operator. NEEDHAM

Comment: commercial nitrate with four calibrants

There are 15128576 (bytes) free on disk.
File B 9102107 CHR will take approximately 5000 (bytes).





PK	9	CP	9	typ S	2.016
PK	10	CP	10	typ S	0.08257 M
PK	11	CP	11	typ S	0.07104 M
PK	12	CP	12	typ S	1.073
PK	13	CP	13	typ S	1.096 N
PK	14	CP	14	typ S	1.251
PK	15	CP	15	typ S	0.05685 M
PK	16	CP	16	typ S	1.202 N
PK	17	CP	17	typ S	0.06927 M
PK	18	CP	18	typ H	3.132
PK	19	CP	19	typ L	0.6013
PK	20	CP	20	typ L	0.5844
PK	21	CP	21	typ G	3.153

Last base 301

Time: 14:59; Date: 01-21-91
Operator: NEEDHAM

Comment: commercial nitrate with four calibrants

Channels 1
Base: 67
Gain: 12

nitrate
Mg/L-N

Base drift correction made
Carryover correction made
Gain drift correction made

Init base					283	
PK	1	CP	1	typ P	3.147	Prime
Rel Abs					0.91	
PK	2	CP	2	typ C	0.5843	0.62ppm
PK	3	CP	3	typ C	1.234 N	1.24
PK	4	CP	4	typ C	2.422 N	2.48
PK	5	CP	5	typ C	3.157	3.1
PK	6	CP	6	typ H	3.174 N	3.1
PK	7	CP	7	typ L	0.5965	0.62
PK	8	CP	8	typ L	0.6190	0.62/kgs
PK	9	CP	9	typ S	2.020	ICV / TIOE VALUE 2ppm 101.0% Recovery
PK	10	CP	10	typ S	0.07426 M	ICB
PK	11	CP	11	typ S	0.06765 M	PO
PK	12	CP	12	typ S	1.382	9011263-01 3x= 4.15
PK	13	CP	13	typ S	1.395 N	OD 3x= 4.19

00600

[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	17	DF	17	[illegible]	[illegible]
[illegible]	18	DF	18	typ	H
[illegible]	19	DF	19	typ	L
[illegible]	20	DF	20	typ	L
[illegible]	21	DF	21	typ	[illegible]
Last base					701

BLANK
CW 1 24 ppm (97.2%)
CL3

107.7 %
Spike Recovery

Sample statistics

Analyte	level	cuts	avg	std dev	cv
1	all	9	0.8777	0.768	92%

Analyte 1 linear fit
Carryover factor: 0.70%.

Chart saved to file B:9102107.CHR.

text file B:9102107.TXT has been saved to disk.

Spike 1ml sample + 1ml 50 ppm = 25 ppm

SKINNER & SHERMAN LABORATORIES

TRAACS 800 SYSTEM BENCH SHEET
GENERAL ANALYSIS

DATE: 12/3/90
ANALYST: WEGHAM
METHOD:

Chloride 325.2

RUN ID'S		WORKORDER
50337	- 01	9011133
	-	9011179
	-	9011176
	-	9011177
	-	9011201
	-	9011262

STANDARDS:	NAME	SOURCE	PREPARED
ICV	1UPS87	(52.1 ppm True value)	9011280 9011288
CCV	50 ppm		9011263
ICB/CCB			

POS	LAB ID	SAMPLE ID	COMMENTS
01	Blank		
02	5 ppm		
03	25		
04	50		
05	75		
06	100		
07	100		
08	5		
09	5		
10	ICV/LCS		
11	ICB		
12	DB		
13	9011133-01		
14	02		
15	9011179-01		
16	02		
17	03		
18	04		
19	05		
20	9011176-01		
21	02		
22	CCV		
23	CCB		
24	03		
25	04		
26	05		
27	06		
28	07		
29	08		
30	08D		
31	08S		
32	09		
33	10		
34	CCV		
35	CCB		

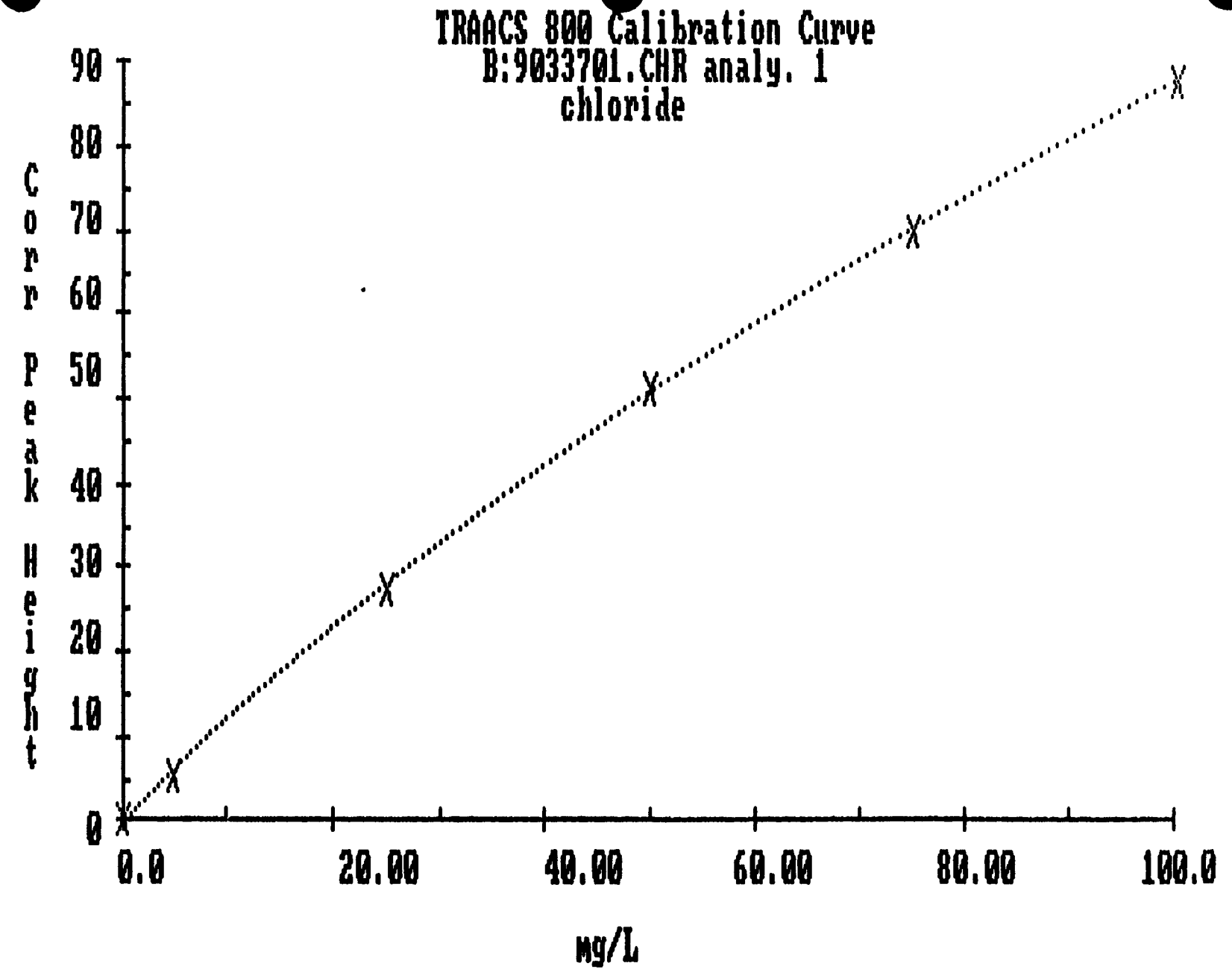
Relabs 0.7400

000006

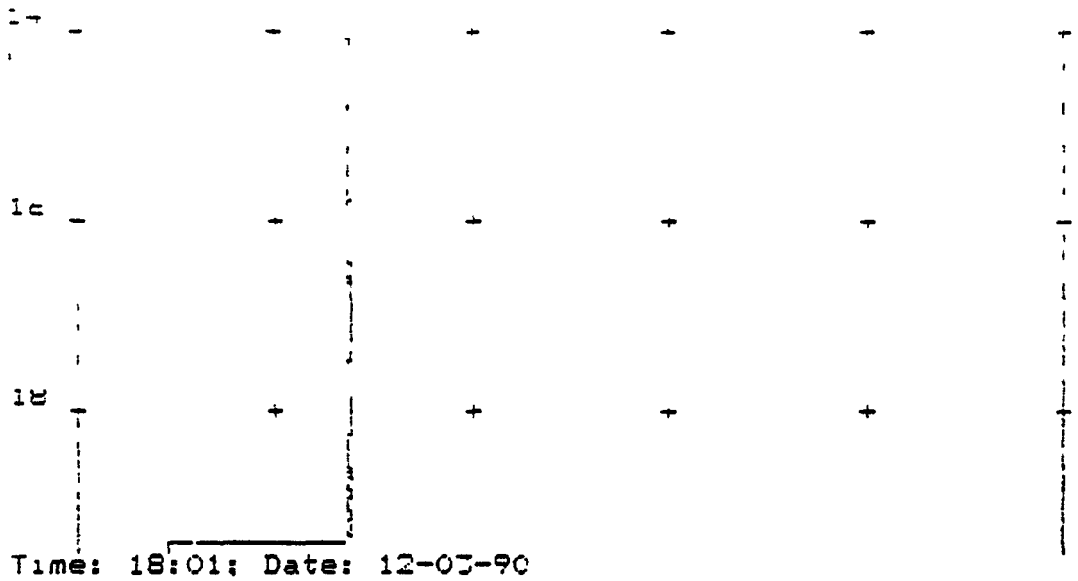
SKINNER & SHERMAN LAB
TRAACS BENCH SHEET
DATE: 12/5/90

RUN ID: 90337

POS	LAB ID	SAMPLE ID	COMMENTS
36	11		
37	12		
38	9011297-01		
39	02		
40	03		
41	9011201-06	5X	
42	9011262-01		
43	02		
44	03		
45	04		
46	CW		
47	CW3		
48	05		
49	06		
50	07		
51	08		
52	9011280-01		
53	02		
54	03		
55	04		
56	05		
57	9011293-01		
58	CW		
59	CW3		
60	02		
61	03		
62	04		
63	05		
64	9011263-01		
65	01D		
66	01S		
67	~~01~~	~~10X~~ 9011201-06	50X
68	~~12/3/90~~ ~~01D~~	~~10X~~	100X
69	~~01S~~	~~10X~~ 9011262-01	STD
70	CW		
71	CW3		
72	BLANK		
73	BLANK		
74	BLANK		
75	BLANK		
76	BLANK		
77	BLANK		
78	BLANK		
79	BLANK		
80	BLANK		
81	9011201-06	500X	
82	CW		
83	CW3		
84			
85			


TRAACS 800 Calibration Curve
B:9033701.CHR analy. 1
chloride
Corr Peak Height
90
80
70
60
50
40
30
20
10
0
0.0
20.00
40.00
60.00
80.00
100.0
mg/L

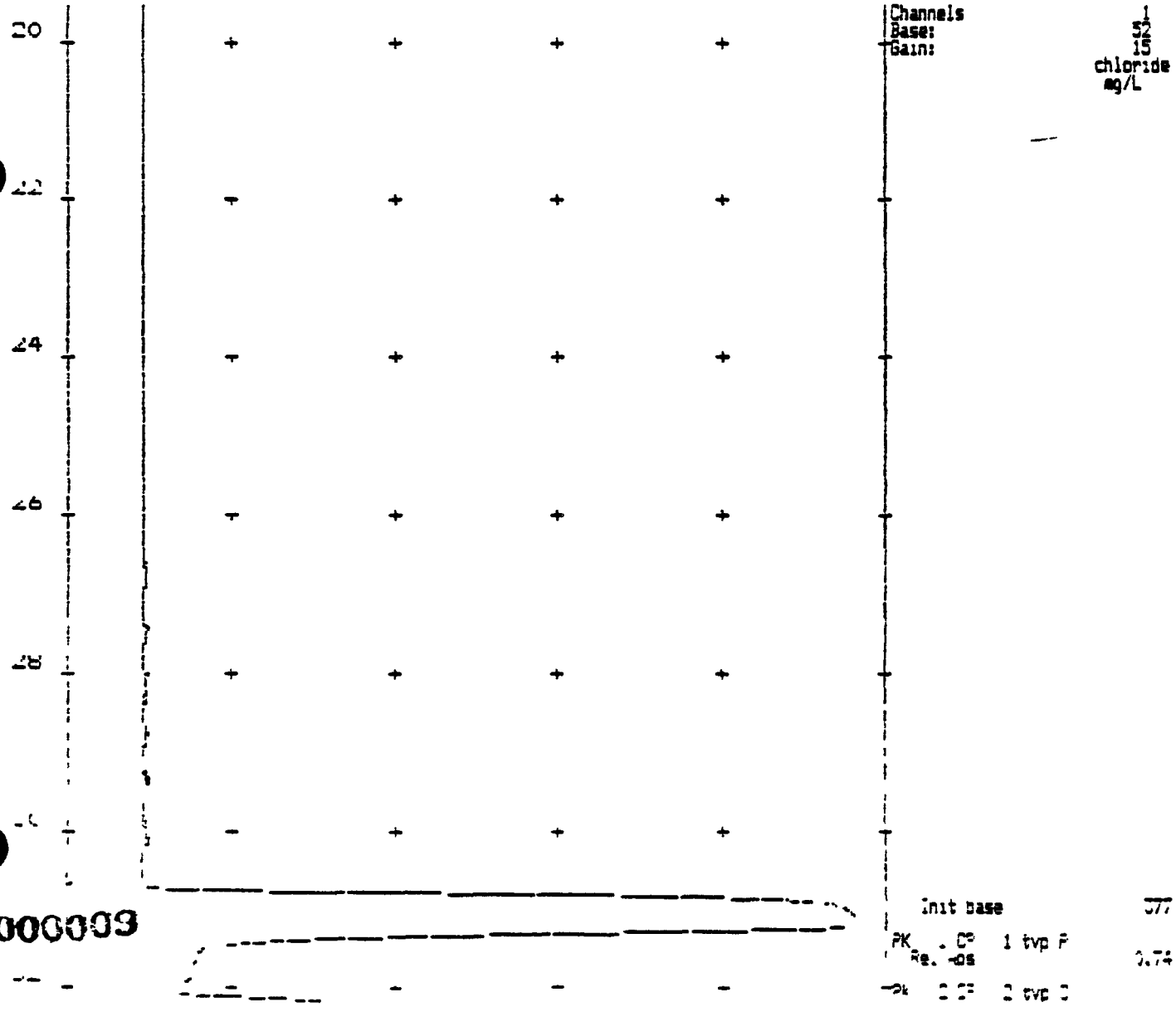
000005



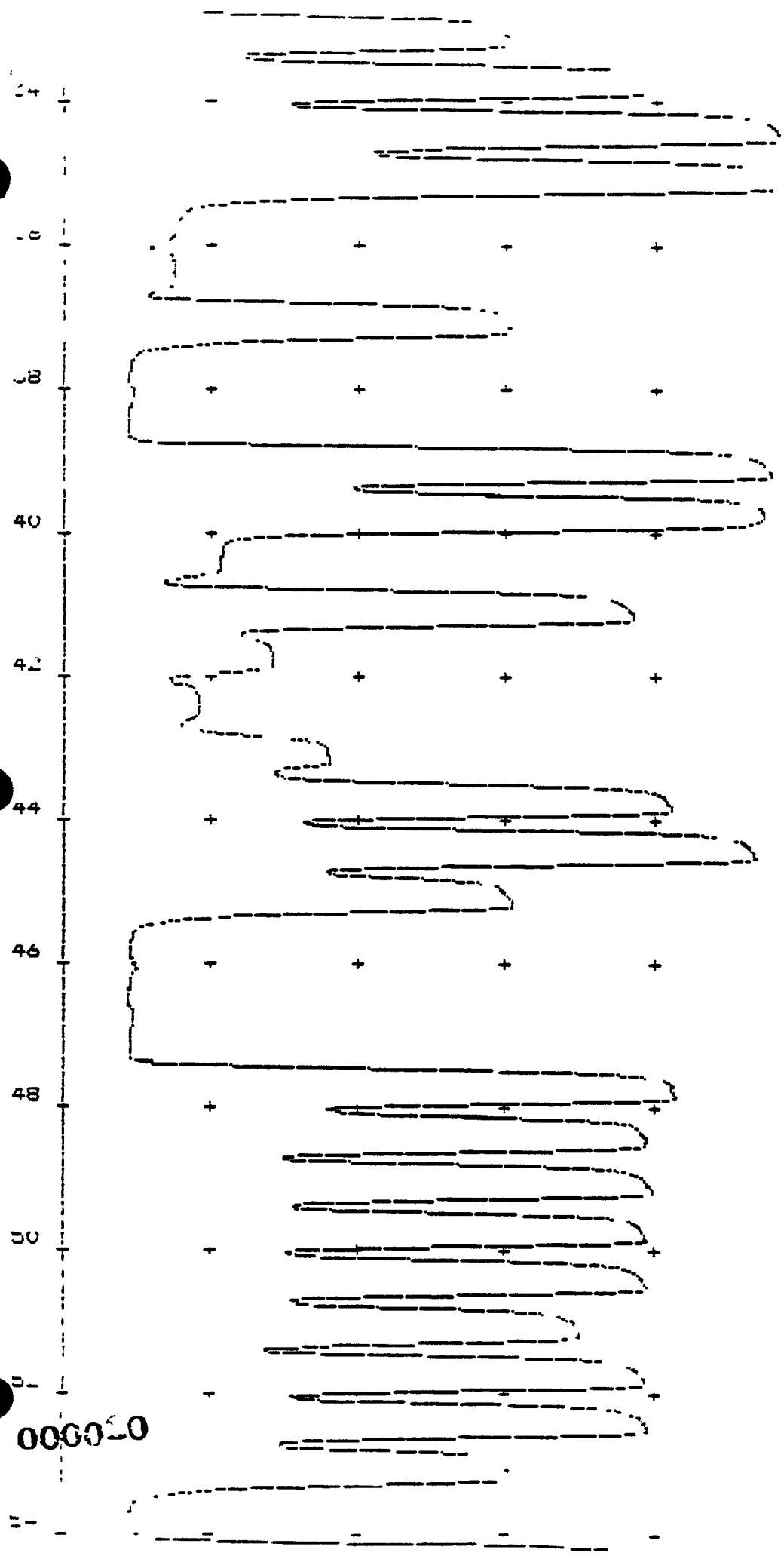
Time: 18:01; Date: 12-03-90
Operator: NEEDHAM

Comment: commercial chloride with five calibrants

There are 14581760 (bytes) free on disk.
File B:9033701.CHR will take approximately 12920 (bytes).

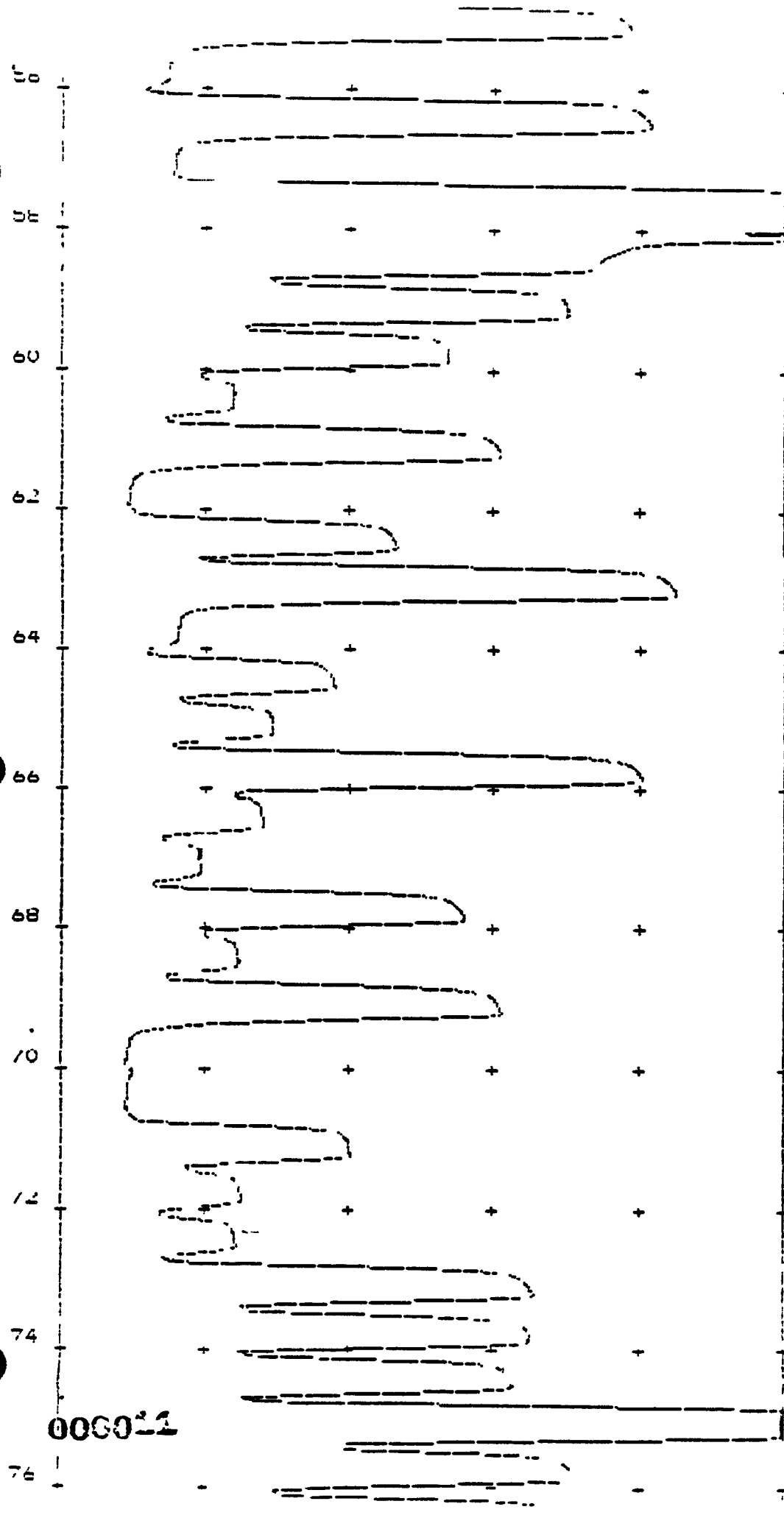


000003



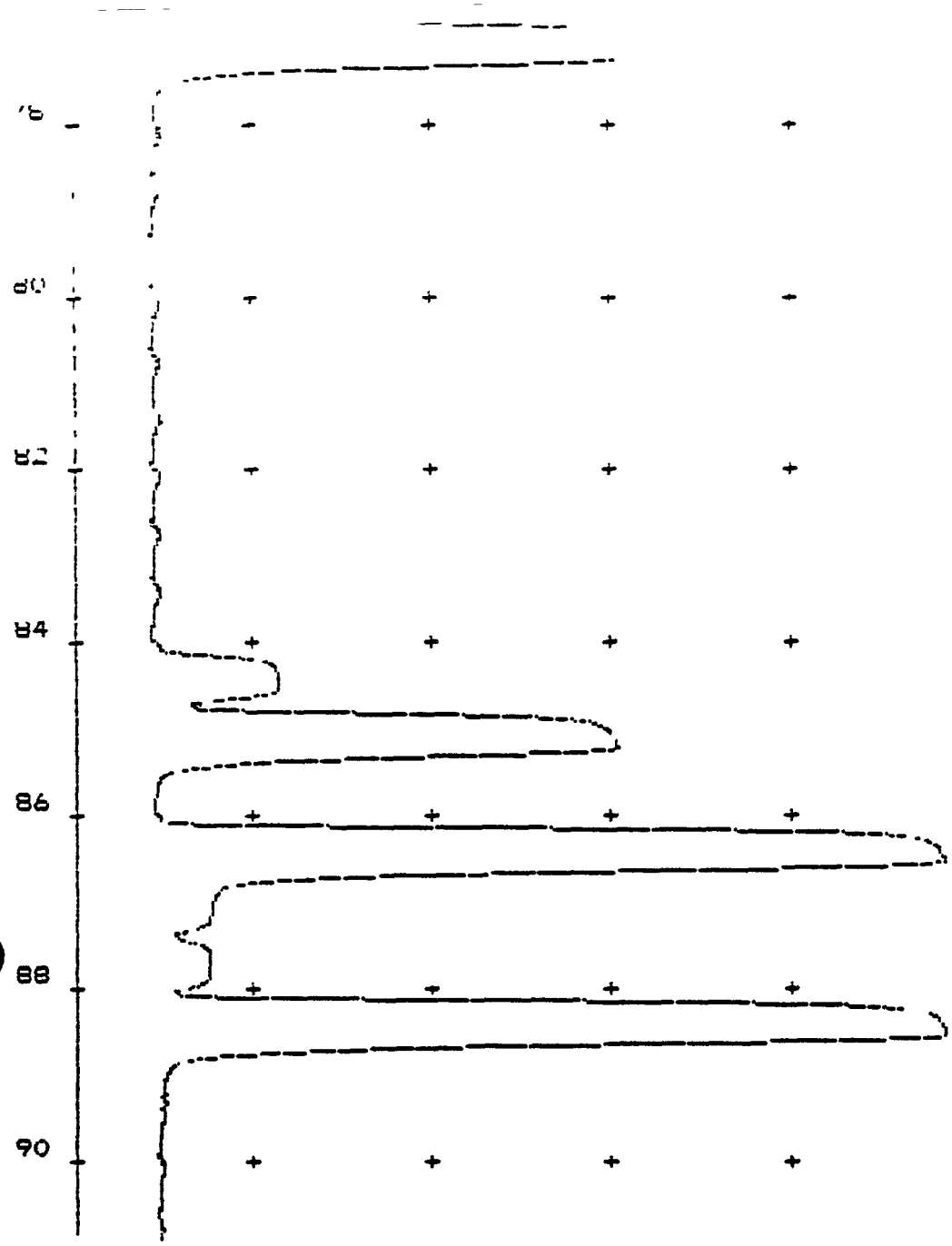
PK	5 CP	5 typ S		
PK	6 CP	6 typ C	[illegible]	
PK	7 CP	7 typ M	[illegible]	
PK	8 CP	8 typ L	4.927	
PK	9 CP	9 typ L	4.828	
PK	10 CP	10 typ S	50.82	
PK	11 CP	11 typ S	0.07050	M
PK	12 CP	12 typ S	-0.07840	M
PK	13 CP	13 typ S	98.39	
PK	14 CP	14 typ S	96.92	
PK	15 CP	15 typ S	9.980	
PK	16 CP	16 typ S	71.90	
PK	17 CP	17 typ S	16.44	
PK	18 CP	18 typ S	7.559	
PK	19 CP	19 typ S	24.05	
PK	20 CP	20 typ S	79.18	
PK	21 CP	21 typ S	95.07	
PK	22 CP	22 typ S	51.23	
PK	23 CP	23 typ S	0.2197	M
PK	24 CP	24 typ S	0.01463	M
PK	25 CP	25 typ S	0.1824	M
PK	26 CP	26 typ S	79.79	
PK	27 CP	27 typ S	74.38	
PK	28 CP	28 typ S	75.48	
PK	29 CP	29 typ S	74.34	
PK	30 CP	30 typ S	74.44	
PK	31 CP	31 typ S	[illegible]	
PK	32 CP	32 typ S	74.48	
PK	33 CP	33 typ S	74.38	
PK	34 CP	34 typ S	[illegible]	
PK	35 CP	35 typ S	[illegible]	

000020



PK	37	CP	37	tvp	S	[illegible]
PK	38	CP	38	tvp	S	4.570
PK	39	CP	39	tvp	S	77.59
PK	40	CP	40	tvp	S	5.247 N
PK	41	CP	41	tvp	S	104.9 D
PK	42	CP	42	typ	S	67.93
PK	43	CP	43	typ	S	62.75
PK	44	CP	44	typ	S	42.96
PK	45	CP	45	typ	S	12.47
PK	46	CP	46	typ	S	51.26
PK	47	CP	47	typ	S	0.3693 M
PK	48	CP	48	typ	S	34.92
PK	49	CP	49	typ	S	82.73
PK	50	CP	50	typ	S	5.728
PK	51	CP	51	typ	S	25.77 N
PK	52	CP	52	typ	S	17.52
PK	53	CP	53	typ	S	76.55
PK	54	CP	54	typ	S	16.17
PK	55	CP	55	typ	S	8.365
PK	56	CP	56	typ	S	45.47
PK	57	CP	57	typ	S	13.06
PK	58	CP	58	typ	S	51.32
PK	59	CP	59	typ	S	0.1824 M
PK	60	CP	60	typ	S	0.07050 M
PK	61	CP	61	tvp	S	28.16
PK	62	CP	62	typ	S	13.41
PK	63	CP	63	typ	S	12.77
PK	64	CP	64	typ	S	56.91
PK	65	CP	65	typ	S	56.37
PK	66	CP	66	typ	S	53.36
PK	67	CP	67	tvp	S	104.9 D
PK	68	CP	68	tvp	S	63.39

000021



PK	70	CP	70	typ S	31.46
PK	71	CP	71	typ S	0.2758 M
PK	72	CP	72	typ S	0.07050 M
PK	73	CP	73	typ S	-0.00399 M
PK	74	CP	74	typ S	-0.1527 M
PK	75	CP	75	typ S	-0.07840 M
PK	76	CP	76	typ S	-0.07840 M
PK	77	CP	77	typ S	-0.1156 M
PK	78	CP	78	typ S	-0.09699 M
PK	79	CP	79	typ S	-0.1156 M
PK	80	CP	80	typ S	-0.1527 M
PK	81	CP	81	typ S	11.52
PK	82	CP	82	typ S	50.99
PK	83	CP	83	typ S	0.07050 M
PK	84	CP	84	typ H	100.7
PK	85	CP	85	typ L	4.967
PK	86	CP	86	typ L	4.768
PK	87	CP	87	typ G	100.9
Last base					391

Time: 18:01; Date: 12-03-90
Operator: NEEDHAM

Comment: commercial chloride with five calibrants

Channels	1
Base:	52
Gain:	15

000022

		chloride mg/L
Base drift correction made		
Carryover correction made		
Gain drift correction made		
Init base		377
PK 1 CP	1 typ F	99.76 Primer
Rel Abs		0.74
PK 2 CP	2 typ C	4.797 5ppm
PK 3 CP	3 typ C	[illegible] 25

PK	6	CP	6	typ	C	99.32	100
PK	7	CP	7	typ	H	99.42	100
PK	8	CP	8	typ	L	4.815	5
PK	9	CP	9	typ	L	4.844	5
PK	10	CP	10	typ	S	50.80	CCU 52.1 (97.5%)
PK	11	CP	11	typ	S	0.02964	M CCU
PK	12	CP	12	typ	S	-0.04705	M Pb
PK	13	CP	13	typ	S	98.45	9011133-01
PK	14	CP	14	typ	S	96.70	-02
PK	15	CP	15	typ	S	9.817	9011176-01
PK	16	CP	16	typ	S	71.82	02
PK	17	CP	17	typ	S	16.27	03
PK	18	CP	18	typ	S	7.508	04
PK	19	CP	19	typ	S	23.96	05
PK	20	CP	20	typ	S	78.99	9011176-01
PK	21	CP	21	typ	S	94.74	02
PK	22	CP	22	typ	S	50.89	CCU 50ppm (101.8%)
PK	23	CP	23	typ	S	0.1432	M CCU3
PK	24	CP	24	typ	S	0.01522	M 03
PK	25	CP	25	typ	S	0.1795	M 04
PK	26	CP	26	typ	S	79.58	05
PK	27	CP	27	typ	S	73.95	06
PK	28	CP	28	typ	S	75.04	07
PK	29	CP	29	typ	S	73.90	08
PK	30	CP	30	typ	S	73.98	08D
PK	31	CP	31	typ	S	62.05	08S 73.9/2 = 36.95 62.05 − 36.95 = 25.1 ÷ 25 = 100.4 % Spike Rec.
PK	32	CP	32	typ	S	74.01	09
PK	33	CP	33	typ	S	73.87	10
PK	34	CP	34	typ	S	51.07	CCU (102.1%)
PK	35	CP	35	typ	S	0.1272	M CCU3
PK	36	CP	36	typ	S	77.65	11
PK	37	CP	37	typ	S	73.37	12
PK	38	CP	38	typ	S	4.381	9011277-01
PK	39	CP	39	typ	S	77.15	-02
PK	40	CP	40	typ	S	5.040	N -03
PK	41	CP	41	typ	S	104.4	D 9011201-06 5x=
PK	42	CP	42	typ	S	67.25	9011262-01
PK	43	CP	43	typ	S	62.15	02
PK	44	CP	44	typ	S	42.46	03
PK	45	CP	45	typ	S	12.22	04
PK	46	CP	46	typ	S	50.80	CCU (101.6 %)
PK	47	CP	47	typ	S	0.2228	M CCU3
PK	48	CP	48	typ	S	34.58	05
PK	49	CP	49	typ	S	82.01	06
PK	50	CP	50	typ	S	5.474	07
PK	51	CP	51	typ	S	25.45	N 08
PK	52	CP	52	typ	S	17.22	9011280-01
PK	53	CP	53	typ	S	75.84	02
PK	54	CP	54	typ	S	15.80	03
PK	55	CP	55	typ	S	8.158	04
PK	56	CP	56	typ	S	44.95	05
PK	57	CP	57	typ	S	12.74	9011288-01
PK	58	CP	58	typ	S	50.72	CCU (101.4 %)
PK	59	CP	59	typ	S	0.00411	M CCU3
PK	60	CP	60	typ	S	-0.03093	M 02
PK	61	CP	61	typ	S	27.76	03
PK	62	CP	62	typ	S	13.09	04
PK	63	CP	63	typ	S	12.49	05
PK	64	CP	64	typ	S	56.20	9011263-01
PK	65	CP	65	typ	S	55.54	01D
PK	66	CP	66	typ	S	52.55	01S 56.2/2 = 28.1 52.55 − 28.1 = 24.45 ÷ 25 = 97.8% Spike Recovery
PK	67	CP	67	typ	S	103.7	D 9011201-06 50x=
PK	68	CP	68	typ	S	62.86	~~100x~~ = -06 100x = 6286.0
PK	69	CP	69	typ	S	22.33	9011262-01 STD

00003

[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	CW
PK	72	CP	72	typ	S	-0.06480	M BLANK
PK	73	CP	73	typ	S	-0.1406	M BLANK
PK	74	CP	74	typ	S	-0.2899	M BLANK
PK	75	CP	75	typ	S	-0.2191	M BLANK
PK	76	CP	76	typ	S	-0.2220	M BLANK
PK	77	CP	77	typ	S	-0.2614	M BLANK
PK	78	CP	78	typ	S	-0.2458	M BLANK
PK	79	CP	79	typ	S	-0.2669	M BLANK
PK	80	CP	80	typ	S	-0.3063	M BLANK.
PK	81	CP	81	typ	S	11.19	9011201-06 500x = 5595.0
PK	82	CP	82	typ	S	50.12	CW (100.2%)
PK	83	CP	83	typ	S	-0.1729	M CW
PK	84	CP	84	typ	H	99.28	
PK	85	CP	85	typ	L	4.577	
PK	86	CP	86	typ	L	4.510	
PK	87	CP	87	typ	G	99.42	
Last base						391	

5595
6286 $\bar{x}$ = 5940.5

Sample statistics

Anal	level	cups	avg	std dev	cv
1	all	74	37.09	34.0	92%

Anal 1: quadratic fit
Carryover factor: 0.20%.

Chart saved to file B:9033701.CHR.

text file B:9033701.TXT has been saved to disk.

000014

December 11, 1992
NEEDHAM

TO Ph 4.5

Alkalinity STD methods 403A

STANDARDIZATION of H_2SO_4
Ref Scotts STD Methods of Chem Analysis
Volume II page 2194

$$\frac{.0426g\ Na_2CO_3}{40.3 \times .053} = 0.0199\ N\ H_2SO_4$$

0.00
40.3

ICU 1.23 — 50ml vol — 0.00 — 1.23

1176-03 2.7 — 2.5 — Ph 4.5 0.2 — 4.2 0.31

1176-04 3.1 — 3.0 — 4.5 0.1 — 4.2 0.2

1176-05 ~~38.6~~ 42.11 — 3.5 — 38.61

1176-06 38.91 — 0.00 — 38.91

1176-07 38.33 — 0.00 — 38.33

1176-08 38.7 — 0.00 — 38.7

1176-08D 38.75 — 0.00 — 38.75

1176-09 29.05 — 0.00 — 29.05

1176-10 38.0 — 0.00 — 38.0

1176-11 35.3 — 0.00 — 35.3

1176-12 32.75 — 0.00 — 32.75

11263-01 39.41 — 0.00 — 39.41

12029-01 2.05 — 0.00 — 2.05

12029-02 4.30 — 2.05 — 2.25

11282-01 37.33 — 4.30 — 33.03

11280-01 10.85 — 0.00 — 10.85

11280-02 2.30 — 0.00 — 2.30

11280-03 40.47 — 2.30 — 38.17

28-04 22.30 — 0.00 — 23.30

11280-05 39.4 — 0.00 — 39.4

11288-01 16.63 — 0.00 — 16.69

~~11288-02~~

000015

11288-07 — 0.0 — 0.15 — 42 0.35

11288-03 37.8 — 0.00 — 37.80

11288-04 21.5 — 0.00 — 21.50

11288-05 16.8 — 0.00 — 16.80

Calculation ml titrant × N × 50000 ÷ sample ml = mg CaCO3/L
Low level 2×(Ph + St 4.2 × N × 50000 ÷ sample ml)

Sample # ICU (mg/L)	Ph	(mg CaCO3/L) Rosch.
9011176-03	6.01	24.48 Tue 0.90
04	5.36	0<
05	7.55	384.17
06	8.16	387.15
07	8.075	381.38
08	8.20	385.07
08D	8.21	385.56
09	7.70	289.05
10	8.13	378.10
11	7.86	351.24
12	7.69	325.86
9011263-01	7.60	392.13
9012029-01	7.22	20.40
02	6.99	22.39
9011282 01H	6.60	328.65
9011280-01	6.63	107.96
02	6.10	22.89
03	6.83	379.79
04	6.93	231.84
05	6.60	392.03
9011288-01	7.95	166.07
02	5.88	0<
03	7.20	376.11
04	7.91	213.93
05	8.01	167.16

Note *
All sample volumes 100 mls except ICU 50 mls

December 7, 1990

Fluoride STANDARD methods 413 b NEEDHAM

Sample Sta	mV	Rec H (mg/L)	
0 PPM	352		
10	283	$\bar{r}$=1.0000	
50	240		
100	222		
ICV/LCS	283	0.9974	True value 1.0 Limits 0.89-1.09
ICB	350		
Pb	351		
9011032-01			
02			01-05 Analyzed on November 25th.
03			
04			
05			
06	307	<1	
07	297	<1	
08	~~301~~ 281	1.08	
09	304	<1	
CW	240	5.04	(100.8 %)
CB	350		
10	314	<1	
11	299	<1	
12	331	<1	
13	342	<1	
14	305	<1	
9011033-15	325	<1	
16	351	<1	
17	341	<1	
18	299	<1	
19	301	<1	
CW	242	4.67	(93.5 %)
CB	357		
20	335	<1	
21	341	<1	
22	334	<1	
23	330	<1	
24	287	<1	
25	281	1.08	

000026

NEEDHAM

Fluorides Continued

Samples/sto	mo	Results (mg/L)
9011033-26	349	<1
27	369	<1
9011176-03	353	<1
04	381	4.68 (93.6 %)
CW	242	<1
CW3	350	
05	287	<1
06	280	1.12
07	280	1.12
08	279	1.16
09	282	1.04
10	280	1.12
11	283	0.997
12	282	1.04
9011263-01	275	1.16
-00	280	1.12
CW	241	4.86 (97.1%)
CW3	350	
-015	252	3.21 3.21 - 1.16 = 2.05 ÷ 2ppm = 102.5% Spike Recovery
CW	243	4.5 (90.1 %)
CW3	350	

Spike

Spiked with WP 987
Concentrate = 100ppm
0.1mL x100 ÷ 5 = 2ppm

000017

[SULFATES] BY STANDARD METHODS 426C

JON ST THOMAS
1/7/91

① add Buffer
② add $BaCl_2$ + Stir 1 min
③ after 6 min read @ 420nm

Sample/STD	sample vol	abs w/o $BaCl_2$	abs w/ $BaCl_2$	Result
0	100 ml	0.000	0.000	
5 ppm			0.008	
10 ppm			0.019	
15 ppm			0.039	
30 ppm			0.115	
40 ppm			0.171	
CCS/ICV (20 ppm)			~~0.060~~ JST	18.5 (93%)
CCB		0.067	~~0.060~~ JST	0
PB			0.000	0
			0.000	
9012106-01	50 ml	0.000		25.1
-02			0.096	25.3 (x2) = 50.2
-03			0.097	27.1 (x2) = 50.6
-04			0.105	25.6 (x2) = 54.2
-05			0.098	19.2 (x2) = 51.2
-06			0.070	20.6 (x2) = 38.4
-07			0.076	29.4 (x2) = 41.2
-08			0.115	31.2 (x2) = 58.8
-08D			0.123	30.7 (x2) = 62.4
			0.121	(x2) = 61.4
CCV (25 ppm)	100 ml		0.098	25.6
CCB	100 ml		0.000	0
-08-S	25 ml		0.102	26.4
-09	50 ml			24.9 (x4) = 105.6
-10			0.095	22.4 (x2) = 49.8
-11			0.084	24.6 (x2) = 44.8
-12			0.0171	19.5 (x2) = 38.0
-13			0.074	20.1 (x2) = 39.0
0000232/4			0.074	20.1 (x2) = 40.2
-15			0.075	20.4 (x2) = 40.2
-16				20.4 (x2) = 40.8

[SULFATES.CONT] BY STANDARD METHODS 426C JOI ST TEMPS 1/7/91

Sample/STD	sample vol	Abs w/o BaCl2	Abs w/BaCl2	Result
				(x2)=48.4
9012106-17	50ml	0.000	0.092	24.2
~~[illegible]~~				
CCV (10ppm)	100ml			9.96 (99.6%)
CCB	100ml		0.029	0 (x2)=39.8
-18	50ml	0.000	0.073	19.9(x2)=48.0
-19				24.0(x2)=45.6
-20			0.091	22.8
			0.086	(x2)=46.2
9012109-01	50ml			23.1(x2)=42.4
-02			0.087	21.2(x2)=40.8
-03			0.079	20.4(x2)=43.4
-04			0.075	21.7(x2)=43.8
-05			0.081	21.9(x2)=52.[illegible]
-06			0.082	26.2(x2)=55.[illegible]
-07			0.101	27.8
			0.108	
CCV (5ppm)	100ml		0.010	5.6
CCB	100ml		0.000	0 (x2)
-08	50ml			22.6 (x2)=45.2
~~-08B~~			~~0.085~~	22.6(x2)=53.[illegible]
-08S (5ppm)			0.104	26.9(x2)=50.[illegible]
-09			0.097 ~~0.98~~	25.3(x2)=44.[illegible]
-10			0.083	22.2(x2)=42.[illegible]
-11			0.080	21.4(x2)=5[illegible]
-12			0.078	25.6(x2)=4[illegible]
-13			0.094	24.6(x2)=5[illegible]
-14			0.102	26.5(x2)=5[illegible]
-15			0.099	25.8(x2)=4[illegible]
0000-0-16			0.079	21.2 (x2)=4[illegible]
-17			0.082	21.9 (x2)
CCV (30ppm)	100ml		0.124	31.4
CCB	100ml		0.000	0
-18	50ml		0.078	21.0 (x2)=4[illegible]
-19	50ml		0.087	23.0 (x2)=4[illegible]

[SULFATES. CONT.] BY STANDARD METHODS 426C JOAN E. THOMAS 1/7/91

sample #	sample vol	abs. w/o $BaCl_2$	abs w/ $BaCl_2$	Result	QC
9012286-22	50 ml	0.000	0.150	37.3 (x2) = 74.6	
CCV (25ppm)	100ml	0.000	0.093	24.4	(97.6%)
CCB	100ml	0.000	0.050	0	
-23	10ml	0.000	0.030	10.2 (x10) = 1020	
-24	50ml		0.084	22.4 (x2) = 44.8	
-24D	50ml		0.083	22.2 (x2) = 44.4	
(20ppm) -24S	50ml		0.170	41.8 (x2) = 83.6	
-25	25ml		0.073	19.9 (x4) = 79.6	
9012288-01	25ml		0.083	22.2 (x4) = 888	
02	100ml		0.002	<5ppm	
03	50ml		0.165	40.7 (x2) = 81.4	
04	50ml		0.086	22.8 (x2) = 45.6	
05	25ml		0.103	26.7 (x4) = 106.8	
9011263-01	50ml		0.112	28.7 (x2) = 57.4	
CCV (25ppm)	100ml		0.098	25.6	
CCB	100ml		0.000	0	

000021

December 8 1990
NEEDHAM

Specific conductivity

(WPS) Sample # ICV	~~247~~ 220	Mult 10	Cell const 0.010273	Temp 21 °C	Result (umhos/cm) 251.6 True Val 267 Lim's 247
901257-01D	2875	10		21 °C	Limits 247–288
Pb	8000	0.01		25C	0.866
901276-01	7500	10			812.61
02	720	100			780.1
03	2275	0.1			2.46
04	1830	0.1			1.98
05	730	100			790.94
06	710	100			769.27
07	725	100			785.52
08	720	100			780.1
09	720	100			780.1
09	625	100			677.17
10	730	100			790.95
11	725	100			785.52
12	670	100			725.93
901297-01	420	10			45.57
02	770	100			834.27
03	860	10			93.18
901263 01	730	100			790.94

Calculation:

umhos = mult × cell const ÷ 1 + 0.025 (T−25)

000022

Woodward Clyde

12/6/90

S011263

TSS

OIC 300 ml's

18 1250

(TSS) 18.1245

0 0005

0.5 x 3.33 = 1.67 mg/L

<3.33

TDS

100 ml's

43 1425

43.0880

0.0545

54.5 x 1000/100 = 545 mg/L

OIC 18 5980 100 ml's

(TDS) 18.5975

0 0005

0.5 x 3.33 = 1.67 mg/L

<3.33

100 ml's

51.0555

0 0585

58.5 x 1000/100 = 585 mg/L

CA 12/7/90

000023

→ See Sample # 03CWC.1005, COC # 015 for TMH/NORCAL for Rad. Assay ←

Woodward-Clyde Consultants
Stanford Place 3 Suite 1000 4582 South Ulster Street Parkway
Denver Colorado 80237 (303) 694-2770

Chain of Custody Record

COC # 016

PROJECT NO. 22558 Task 500

SAMPLERS: (Signature) BR Clow

DATE	TIME	SAMPLE NUMBER	Metals	Wet Chem*	NO_3/NO_2					NUMBER OF CONTAINERS
11/28/90	1000	03CWC.1005	X	X	X					3

BR Clow 11/28/90

REMARKS (Sample preservation handling procedures, etc.)
For TMH-Skinner/Sherman

Matrix – Water

All samples stored on ice.

*Wet Chem:
Cl^-, F^-, Carb./Bicarb., pH, Sulfate, TDS, TSS, Conductivity

– Metals Preserved w/ HNO_3 to pH<2

– NO_3/NO_2 preserved w/ H_2SO_4 to pH<2

Contact personnel:
Brian Clow
(303) 279-4501 x205

TOTAL NUMBER OF CONTAINERS 3

RELINQUISHED BY (Signature)	DATE/TIME	RECEIVED BY (Signature)	RELINQUISHED BY (Signature)	DATE/TIME	RECEIVED BY (Signature)
BR Clow	11/28/90 1500				

METHOD OF SHIPMENT	SHIPPED BY (Signature)	COURIER (Signature)	RECEIVED FOR LAB BY (Signature)	DATE/TIME
			[illegible]	11/29/90 9:30

0000-2

SKINNER & SHERMAN LABS

Receiving Log at Loading Dock

DOCUMENT# 3 22
(BOOK# - PAGE#)

DATE	AIRBILL #	RTD	SENDER	# of CONT	TIME	INIT & COMMENTS
11/29/90	9380624131		Donohue Sheffield	1	9:30	AB
11/29/90	9380624890		" "	1	9:30	AB
11/29/90	8004385475		NUS Tucker CA	2	9:30	AB
11/29/90	8545141850		ICF Edison NJ	1	9:30	AB
11/29/90	2249186533		NUS Wayne PA	1	9:30	AB
11/29/90	no #		Woodward Clyde Denver CO	1	9:30	AB
11/30/90	1314424434		TMACR 6	2	9:30	JD
11/30/90	7074590202		Normandeau	1	9:30	JD
	8939040040		Camp Dresser	1	9:30	JD
	7844545763		Normandeau	2	9:30	JD
	9380624066		Donohue	1	9:30	JD
	3693733582		Tetratech	1	9:30	JD
	3561453976		NUS Corp	1	9:30	JD
	3561452381		NUS Corp	1	9:30	JD
	8855250252		Dynamic	1	9:30	JD
	8300438243		NUS Corp	1	9:30	JD
	8545141872		ICF	1	9:30	JD
11/30/90	9130260370		NUS Edison NJ	1	9:30	AB
11/30/90	4364935241		Compuchem Apex NC	1	9:30	AB
	4364935142					AB
	4364932216					AB
	4364932342					AB
	4364932040					AB
	4364932543					AB
	4364932740					AB
12/01/90	8939040025		COM Edison NJ	1	10:00	AB
12/01/90	9140445650		Alliance Louisville MH	1	10:00	AB
12/01/90	8545140984		ICF Edison NJ	1	10:00	AB
12/01/90	9380624341		Donohue Houlton ME	2	10:00	AB
12/01/90	3821452473		NUS Bedford MA	1	10:00	AB
12/01/90	6273432283		ENSR Acton MA	1	10:00	AB
12/3	1742320521[illegible]		Tunnelmaster	1	9:00	JD
12/[illegible]	3726[illegible]		[illegible]			
12/[illegible]	8605555[illegible]		[illegible]	1	9:30	JD
12/[illegible]	8878[illegible]7451		echem	1	9:30	JD
12/[illegible]	7955[illegible]		[illegible]	1	9:30	JD
[illegible]	8479[illegible]3122		[illegible]		9:30	JD

TMA
Thermo Analytical Inc.

Skinner & Sherman Laboratories Inc.
300 Second Avenue
Post Office Box 521
Waltham MA 02254-0521
(617) 890-7200

Federal Express #9295313296
February 12, 1991

TMA/NORCAL
2030 Wright Avenue
Richmond ,CA 94804
Attention: Dan Steurmer

Dear To Whom It May Concern:

Enclosed are the results for the wet chemical analysis of twenty water samples received on December 11, 1991. The samples were analyzed under Skinner and Sherman work order number 9012106.

Duplicate, matrix spike, blank, and laboratory control sample results are included in the quality control section of the report. The laboratory control samples are EPA QC samples where available or alternate source standards. The true values and recoveries are reported in the QC section of the report. All holding times were met for the various analysis. All raw data is included in the report. All analysis were performed in strict accordance with the methods specified in the report.

Please feel free to call if there are any questions concerning the enclosed.

Sincerely,

SKINNER & SHERMAN LABORATORIES

David N. Peterson
Assistant Laboratory Manager

Scientific Services Since 1922

ENVIRONMENTAL

CHEMICAL ■ PHYSICAL

ELECTRICAL ■ METALLURGICAL

prepared for

TMA/NORCAL

WORK ORDER #9012106

TMA
Thermo Analytical Inc.

Skinner & Sherman Laboratories Inc.

300 Second Avenue, P O Box 521 Waltham, Massachusetts 02254-0521 (617) 890-7200
1-800-4 LAB TEST FAX (617) 890-3883

 Skinner&Sherman REPORT Work Order # 90-12-106

Received: 12/11/90 02/12/91 15:28:02

REPORT TMA/NORCAL
TO 2030 Wright Avenue
Richmond, CA 94804

ATTEN Dan Steurmer

CLIENT WOODWARD NOR SAMPLES 20
COMPANY TMA/NORCAL
FACILITY Richmond, CA

PREPARED TMA / Skinner & Sherman Labs.
BY 300 Second Avenue
P.O. Box 521
Waltham, MA 02254

ATTEN Client Services
PHONE (617) 890-7200

CERTIFIED BY

CONTACT DP

WORK ID Woodward Clyde COC #021,022
TAKEN By CLient
TRANS Fedex
TYPE Wet Chem Samples
P O # N1-01-023/TMA 8084
INVOICE under separate cover

SAMPLE IDENTIFICATION

01 04CWC1006
02 30CPF1001
03 30CPF1002
04 30CPF1003
05 30CPF1004
06 30CPF1005
07 30CPF1006
08 30CPF1007
09 32CPF1008
10 32CPF1009
11 32CPF1010
12 32CPF1011
13 32CPF1012
14 32CPF1013
15 32CPF1014
16 32CPF1015
17 32CPF1016
18 32CPF1017
19 32CPF1018
20 32CPF1019

TEST CODES and NAMES used on this workorder

CL W	Chloride - Aqueous
CO3 W	CARBONATE
F W	Fluoride - Aqueous
NO3NO2	Nitrate Plus Nitrite
PH W	pH - Aqueous
SO4 W	Sulfate - Aqueous
S COND	Specific Conductance
TDS	Total Dissolved Solids
TSS	Total Suspended Solids

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TMA
Thermo Analytical Inc.
Skinner & Sherman Laboratories Inc.
300 Second Avenue, P O Box 521, Waltham, Massachusetts 02254-0521 (617) 890-7200
1-800-4 LAB TEST FAX (617) 890-3883

Received: 12/11/90 Results by Sample

SAMPLE ID 04CWC1006 SAMPLE # 01 FRACTIONS A,B
Date & Time Collected not specified Category

CL_W	CO3_W	F_W	NO3NO2	PH_W	SO4_W
59.2 mg/L	392 mg CaCO3/L	1.1 mg/L	3.31 mg N/L	7.31 pH units	50.2 mg/L

S_COND	TDS	TSS
960 micromhos	585 mg/L	<3.3 mg/L

SAMPLE ID 30CPF1001 SAMPLE # 02 FRACTIONS: A,B
Date & Time Collected not specified Category

CL_W	CO3_W	F_W	NO3NO2	PH_W	SO4_W
56.4 mg/L	380 mg CaCO3/L	1 0 mg/L	3.78 mg N/L	7 58 pH units	50.6 mg/L

S_COND	TDS	TSS
960 micromhos	605 mg/L	<3.3 mg/L

SAMPLE ID 30CPF1002 SAMPLE # 03 FRACTIONS A,B
Date & Time Collected not specified Category

CL_W	CO3_W	F_W	NO3NO2	PH_W	SO4_W
56.5 mg/L	396 mg CaCO3/L	1.1 mg/L	3.79 mg N/L	7 59 pH units	54 2 mg/L

S_COND	TDS	TSS
949 micromhos	585 mg/L	<3.5 mg/L

SAMPLE ID 30CPF1003 SAMPLE # 04 FRACTIONS. A,B
Date & Time Collected not specified Category

CL_W	CO3_W	F_W	NO3NO2	PH_W	SO4_W
56.9 mg/L	394 mg CaCO3/L	1.1 mg/L	3.77 mg N/L	7.82 pH units	51 2 mg/L

S_COND	TDS	TSS
954 micromhos	580 mg/L	<3.3 mg/L

SAMPLE ID 30CPF1004 SAMPLE # 05 FRACTIONS A,B
Date & Time Collected not specified Category

CL_W	CO3_W	F_W	NO3NO2	PH_W	SO4_W
56.5 mg/L	392 mg CaCO3/L	1.0 mg/L	3 85 mg N/L	7 62 pH units	38.4 mg/L

S_COND	TDS	TSS
960 micromhos	590 mg/L	<3.3 mg/L

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Skinner & Sherman Laboratories Inc.
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1-800-4 LAB TEST FAX (617) 890-3883

Received: 12/11/90 Results by Sample

SAMPLE ID 30CPF1005 SAMPLE # 06 FRACTIONS. A,B
Date & Time Collected not specified Category

CL_W	CO3_W	F_W	NO3NO2	PH_W	SO4_W
56.7 mg/L	386 mg CaCO3/L	1.0 mg/L	3.85 mg N/L	7.93 pH units	41.2 mg/L

S_COND	TDS	TSS
949 micromhos	590 mg/L	<3.3 mg/L

SAMPLE ID 30CPF1006 SAMPLE # 07 FRACTIONS. A,B
Date & Time Collected not specified Category

CL_W	CO3_W	F_W	NO3NO2	PH_W	SO4_W
56.5 mg/L	386 mg CaCO3/L	1.0 mg/L	3.79 mg N/L	7 51 pH units	58 8 mg/L

S_COND	TDS	TSS
954 micromhos	515 mg/L	<3.3 mg/L

SAMPLE ID 30CPF1007 SAMPLE # 08 FRACTIONS. A,B
Date & Time Collected not specified Category

CL_W	CO3_W	F_W	NO3NO2	PH_W	SO4_W
56.4 mg/L	384 mg CaCO3/L	<1 0 mg/L	3.53 mg N/L	7 61 pH units	62 4 mg/L

S_COND	TDS	TSS
954 micromhos	510 mg/L	<3.3 mg/L

SAMPLE ID 32CPF1008 SAMPLE # 09 FRACTIONS. A,B
Date & Time Collected not specified Category

CL_W	CO3_W	F_W	NO3NO2	PH_W	SO4_W
58.3 mg/L	370 mg CaCO3/L	1.0 mg/L	3.71 mg N/L	7.41 pH units	49 8 mg/L

S_COND	TDS	TSS
960 micromhos	550 mg/L	<3.3 mg/L

SAMPLE ID 32CPF1009 SAMPLE # 10 FRACTIONS. A,B
Date & Time Collected not specified Category

CL_W	CO3_W	F_W	NO3NO2	PH_W	SO4_W
58.6 mg/L	366 mg CaCO3/L	<1.0 mg/L	3.83 mg N/L	7.92 pH units	44.8 mg/L

S_COND	TDS	TSS
960 micromhos	545 mg/L	<3.3 mg/L

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Skinner & Sherman Laboratories Inc. 300 Second Avenue, P O Box 521, Waltham, Massachusetts 02254-0521 (617) 890-7200

Received: 12/11/90 Results by Sample

SAMPLE ID 32CPF1010 SAMPLE # 11 FRACTIONS· A,B
Date & Time Collected not specified Category

CL_W	CO3_W	F_W	NO3NO2	PH_W	SO4_W
58.3 mg/L	376 mg CaCO3/L	1.0 mg/L	3.76 mg N/L	7.52 pH units	48.0 mg/L

S_COND	TDS	TSS
960 micromhos	555 mg/L	<3.3 mg/L

SAMPLE ID 32CPF1011 SAMPLE # 12 FRACTIONS. A,B
Date & Time Collected not specified Category

CL_W	CO3_W	F_W	NO3NO2	PH_W	SO4_W
58.3 mg/L	362 mg CaCO3/L	<1.0 mg/L	3.81 mg N/L	7 83 pH units	39.0 mg/L

S_COND	TDS	TSS
954 micromhos	555 mg/L	<3 3 mg/L

SAMPLE ID 32CPF1012 SAMPLE # 13 FRACTIONS A,B
Date & Time Collected not specified Category

CL_W	CO3_W	F_W	NO3NO2	PH_W	SO4_W
58.1 mg/L	386 mg CaCO3/L	<1.0 mg/L	3.83 mg N/L	7.49 pH units	40.2 mg/L

S_COND	TDS	TSS
960 micromhos	520 mg/L	<3.3 mg/L

SAMPLE ID 32CPF1013 SAMPLE # 14 FRACTIONS A,B
Date & Time Collected not specified Category

CL_W	CO3_W	F_W	NO3NO2	PH_W	SO4_W
58.8 mg/L	376 mg CaCO3/L	<1.0 mg/L	3.75 mg N/L	7.90 pH units	40.2 mg/L

S_COND	TDS	TSS
960 micromhos	555 mg/L	<3.3 mg/L

SAMPLE ID 32CPF1014 SAMPLE # 15 FRACTIONS. A,B
Date & Time Collected not specified Category

CL_W	CO3_W	F_W	NO3NO2	PH_W	SO4_W
58.5 mg/L	378 mg CaCO3/L	<1.0 mg/L	3.80 mg N/L	7.64 pH units	40.8 mg/L

S_COND	TDS	TSS
954 micromhos	525 mg/L	10.0 mg/L

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1-800-4 LAB TEST FAX (617) 890-3883

Received: 12/11/90 Results by Sample

SAMPLE ID 32CPF1015 SAMPLE # 16 FRACTIONS. A,B
Date & Time Collected not specified Category

CL_W	CO3_W	F_W	NO3NO2	PH_W	SO4_W
58.5 mg/L	382 mg CaCO3/L	<1.0 mg/L	3.81 mg N/L	7 84 pH units	40 8 mg/L

S_COND	TDS	TSS
960 micromhos	535 mg/L	<3.3 mg/L

SAMPLE ID 32CPF1016 SAMPLE # 17 FRACTIONS: A,B
Date & Time Collected not specified Category

CL_W	CO3_W	F_W	NO3NO2	PH_W	SO4_W
58.6 mg/L	390 mg CaCO3/L	<1.0 mg/L	3.79 mg N/L	7.69 pH units	48.4 mg/L

S_COND	TDS	TSS
960 micromhos	560 mg/L	5.5 mg/L

SAMPLE ID 32CPF1017 SAMPLE # 18 FRACTIONS. A,B
Date & Time Collected not specified Category

CL_W	CO3_W	F_W	NO3NO2	PH_W	SO4_W
58.4 mg/L	382 mg CaCO3/L	<1.0 mg/L	3.59 mg N/L	7.89 pH units	39 8 mg/L

S_COND	TDS	TSS
949 micromhos	545 mg/L	<3.3 mg/L

SAMPLE ID 32CPF1018 SAMPLE # 19 FRACTIONS. A,B
Date & Time Collected not specified Category

CL_W	CO3_W	F_W	NO3NO2	PH_W	SO4_W
59.5 mg/L	374 mg CaCO3/L	<1.0 mg/L	3.72 mg N/L	7 62 pH units	48 0 mg/L

S_COND	TDS	TSS
949 micromhos	560 mg/L	3.7 mg/L

SAMPLE ID 32CPF1019 SAMPLE # 20 FRACTIONS A,B
Date & Time Collected not specified Category

CL_W	CO3_W	F_W	NO3NO2	PH_W	SO4_W
62.5 mg/L	422 mg CaCO3/L	<1.0 mg/L	3.72 mg N/L	7.97 pH units	45 6 mg/L

S_COND	TDS	TSS
960 micromhos	555 mg/L	3.7 mg/L

TMA
Thermo Analytical Inc.
Skinner & Sherman Laboratories Inc.

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300 Second Avenue, P O Box 521, Waltham, Massachusetts 02254-0521 (617) 890-7200
1-800-4 LAB TEST FAX (617) 890-3883

Received: 12/11/90 02/12/91 15:28:02

TMA/NORCAL

QUALITY CONTROL

NITRATE/NITRITE

MATRIX SPIKE

Sample ID	Sample Result	Spike Added	Spike Result	% Recovery
9012106-01	(1.1) 3 31 mg/L	1 55 mg/L	3 52 mg/L	128 3

$\left(\frac{3.52-3.31}{1.55}\right)100\% =$ 13.5 % ok

DUPLICATE

Sample ID	Sample Result	Duplicate Result	Relative % Difference
9012106-01	3 31 mg/L	3 72 mg/L	11 7

QUALITY CONTROL SAMPLES

Sample ID	True Value	Found Value	% Recovery
LCS	2.00 mg/L	2 03 mg/L	101 5
Blank		<0 25 mg/L	

CHLORIDE

MATRIX SPIKE

Sample ID	Sample Result	Spike Added	Spike Result	% Recovery
9012106-01	(1 1) 59 2 mg/L	25 0 mg/L	54 9 mg/L	101 2

$\left(\frac{54.9-59.2}{25.0}\right)100\%$ ok -17.2%

DUPLICATE

Sample ID	Sample Result	Duplicate Result	Relative % Difference
9012106-01	59 2 mg/L	59 0 mg/L	0 3

QUALITY CONTROL SAMPLES

Sample ID	True Value	Found Value	% Recovery
LCS	52 1 mg/L	51 8 mg/L	99 4
Blank		<5 0 mg/L	

ALKALINITY

DUPLICATE

Sample ID	Sample Result	Duplicate Result	Relative % Difference
9012106-20	422 mg/L	424 mg/L	0 5

QUALITY CONTROL SAMPLES

Sample ID	True Value	Found Value	% Recovery
LCS	27 0 mg/L	25 9 mg/L	95 9

FLUORIDE

TMA
Thermo Analytical Inc.

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Skinner & Sherman Laboratories Inc. 300 Second Avenue, P O Box 521, Waltham, Massachusetts 02254-0521 (617) 890-7200
1-800-4 LAB TEST FAX (617) 890-3883

TMA/NORCAL

MATRIX SPIKE

Sample ID	Sample Result	Spike Added	Spike Result	% Recovery
9012106-01	(1 1) 1 1 mg/L	2.5 mg/L	2.9 mg/L	94.0

DUPLICATE

Sample ID	Sample Result	Duplicate Result	Relative % Difference
9012106-01	1 1 mg/L	<1 0 mg/L ND	~~200.0~~ NC

QUALITY CONTROL SAMPLES

Sample ID	True Value	Found Value	% Recovery
LCS	1 0 mg/L	1 0 mg/L	100.0
Blank		<1 0 mg/L	

SULFATE

MATRIX SPIKE

Sample ID	Sample Result	Spike Added	Spike Result	% Recovery
9012106-08	62 4 mg/L	40 0 mg/L	106 mg/L	109 0

105.8%
106%

if Sample result is 60.5 then can get 5

DUPLICATE

Sample ID	Sample Result	Duplicate Result	Relative % Difference
9012106-08	62 4 mg/L	61 4 mg/L	1 6

QUALITY CONTROL SAMPLES

Sample ID	True Value	Found Value	% Recovery
LCS	20 0 mg/L	18.5 mg/L	92 5
Blank		<5 0 mg/L	

SPECIFIC CONDUCTANCE

DUPLICATE

Sample ID	Sample Result	Duplicate Result	Relative % Difference
9012106-01	960 micromhos	960 micromhos	0

QUALITY CONTROL SAMPLES

Sample ID	True Value	Found Value	% Recovery
LCS	267 micromhos	286 micromhos	107.1
Blank		1 0 micromhos	

OK

TOTAL DISSOLVED SOLIDS

QUALITY CONTROL SAMPLES

Sample ID	True Value	Found Value	% Recovery
LCS	414 mg/L	435 mg/L	105.1

TMA
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Skinner & Sherman Laboratories Inc. 300 Second Avenue, P O Box 521, Waltham, Massachusetts 02254-0521 (617) 890-7200
1 800 4 LAB TEST FAX (617) 890 3892

TMA/NORCAL

TOTAL SUSPENDED SOLIDS

QUALITY CONTROL SAMPLES

Sample ID	True Value	Found Value	% Recovery
LCS	32.1 mg/L	28 0 mg/L	87 2

TMA
Thermo Analytical Inc.

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Skinner & Sherman Laboratories Inc. 300 Second Avenue, P O Box 521, Waltham, Massachusetts 02254-0521 (617) 890-7200
1-800-4LAB TEST FAX (617) 890-2002

TEST CODE CL W NAME Chloride - Aqueous

Standard Methods for Chemical Analysis of Water and Wastes
EPA - 600/4-79-020, March 1979, Method 325.2.

TEST CODE CO3 W NAME CARBONATE

Standard Methods for the Examination of Water and Wastewater (16th Edition, 1985), Method 403.

TEST CODE F W NAME Fluoride - Aqueous

Method for Chemical Analysis of Water and Wastes EPA-600/4-79-020, March 1983 Method 340.2.

TEST CODE NO3NO2 NAME Nitrate Plus Nitrite

Methods for Chemical Analysis of Water and Wastes
EPA - 600/4-79-020 March 1979 Method 353 1

TEST CODE PH W NAME pH - Aqueous

Standard Methods for the Examination of Water and Wastewater, (16th Edition, 1985), Method 423

TEST CODE SO4 W NAME Sulfate - Aqueous

Standard Methods for the Examination of Water and Wastewater (16th Edition) Method 426C

TEST CODE S COND NAME Specific Conductance

Standard Methods for the Examination of Water and Wastewater, (16th Edition, 1985), Method 205

TEST CODE TDS NAME Total Dissolved Solids

Standard Methods for the Examination of Water and Wastewater, (16th Edition, 1985) Method 209B.

TEST CODE TSS NAME Total Suspended Solids

Standard Methods for the Examination of Water and Wastewater (16th Edition, 1985), Method 209C.

TMA
Thermo Analytical Inc.

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Skinner & Sherman Laboratories Inc. 300 Second Avenue, P O Box 521, Waltham, Massachusetts 02254-0521 (617) 890-7200
1-800-4 LAB TEST FAX (617) 890-3883

SKINNER & SHERMAN LABORATORIES

TRAACS 800 SYSTEM BENCH SHEET
GENERAL ANALYSIS

DATE: 1/7/91
ANALYST: LEEDHAM
METHOD:
Nitrate/Nitrite 353.2

RUN ID'S		WORKORDER
Se 91007	- 05	9012106
	-	9012109
	-	
	-	
	-	
	-	

STANDARDS:	NAME	SOURCE	PREPARED
ICV	NPS87		
CCV	1.24 ppm		
ICB/CCB			

rel Abs 0.8900

POS	LAB ID	SAMPLE ID	COMMENTS
01	Prime		
02	0.62		
03	1.24		
04	2.48		
05	3.1		
06	3.1		
07	0.62		
08	0.62		
09	ICV/LCS		
10	ICB		
11	Pb		
12	9012106-01	2x Dilution	
13	010		
14	015		
15	02		
16	03		
17	04		
18	05		
19	06		
20	07		
21	CCV		
22	CCB		
23	08	2x Dilution	
24	09		
25	10		
26	11		
27	12		
28	13		
29	14		
30	15		
31	16		
32	17		
33	CCV		
34	CCB		
35	18	2x	

Spike 1.55 ppm
1ml sample
Plus 1ml 3.1 ppm
Thus 1.55 ppm

56

SKINNER & SHERMAN LAB
TRAACS BENCH SHEET
DATE: 1/7/91

RUN ID: 91007

POS	LAB ID	SAMPLE ID	COMMENTS
36	19	2x Dilution	
37	20		
38	9012109-01		
39	010		
40	015		
41	02		
42	03	SD	
43	04	(2x)	
44	05	(2x)	
45	CCV		
46	CCB		
47	06	2x Dilution	
48	07		
49	08		
50	09		
51	10		
52	11		
53	12		
54	13		
55	14		
56	15		
57	CCV		
58	CCB		
59	16	2x Dilution	
60	17		
61	18		
62	19		
63	CCV		
64	CCB		
65			
66			
67			
68			
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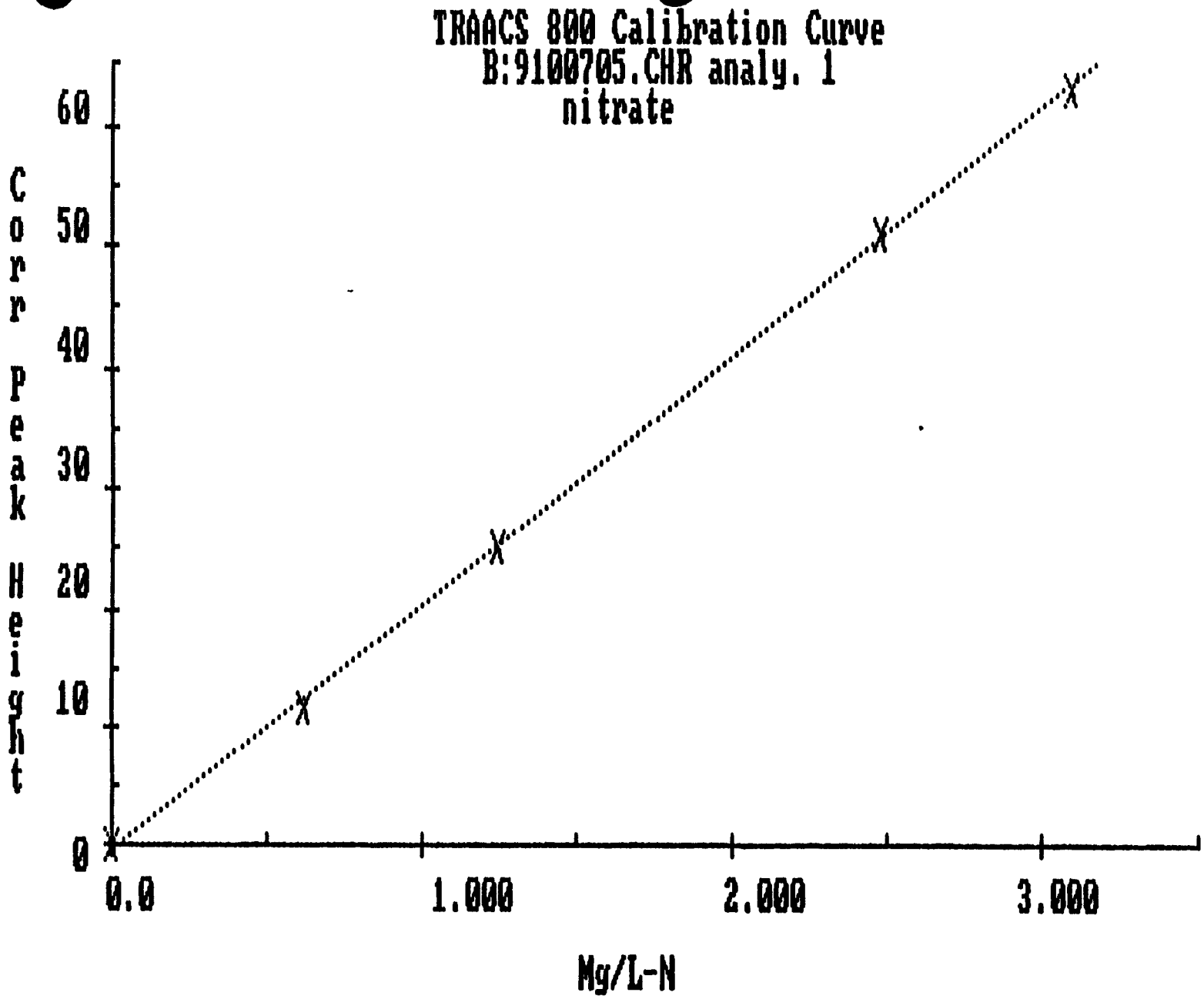
85			


TRAACS 800 Calibration Curve
B:9100705.CHR analy. 1
nitrate
Corr Peak Height
60
50
40
30
20
10
0
0.0
1.000
2.000
3.000
Mg/L-N

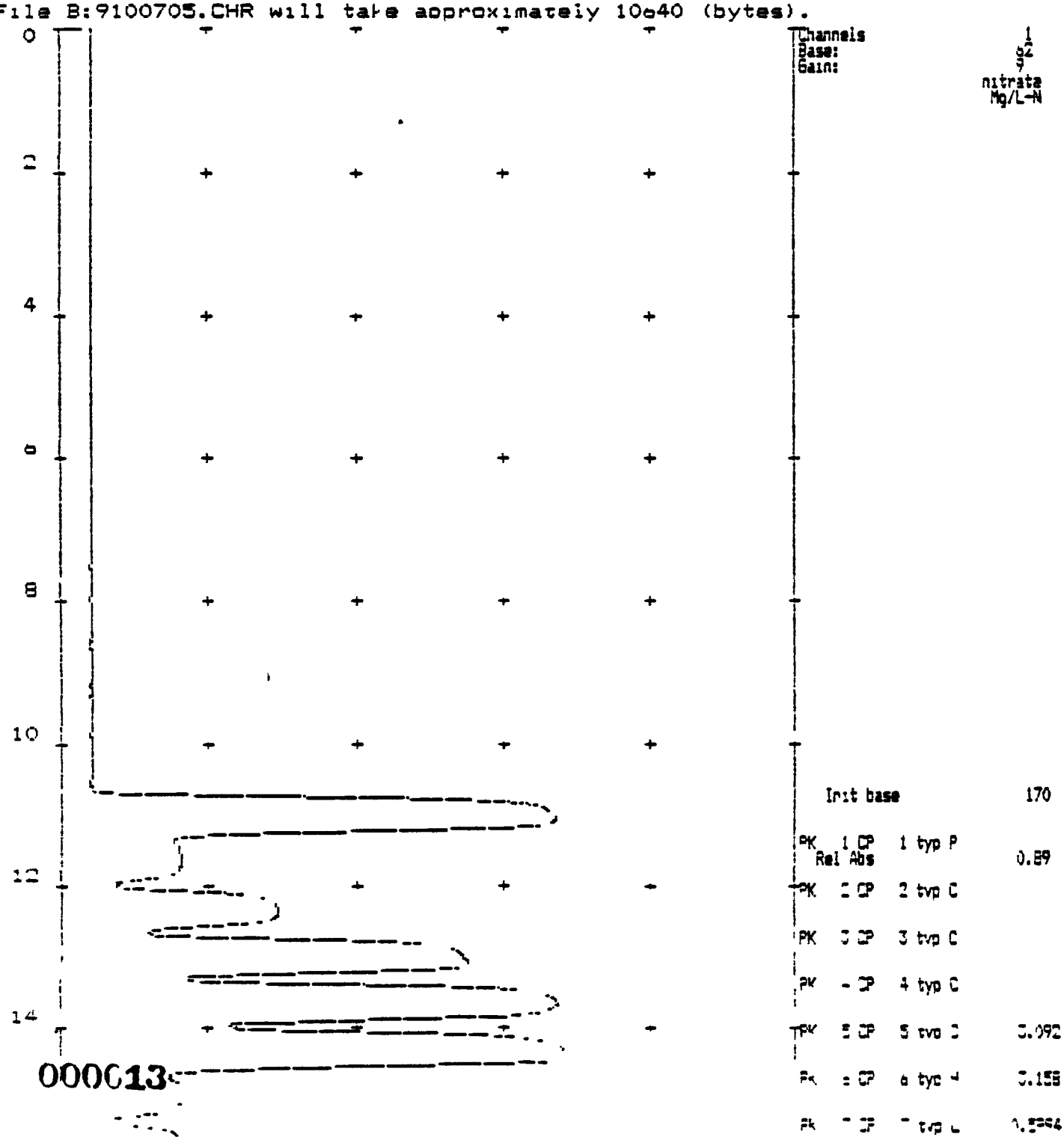
000012

Chart minimum: 0%, maximum 100%
Active analyses: 1

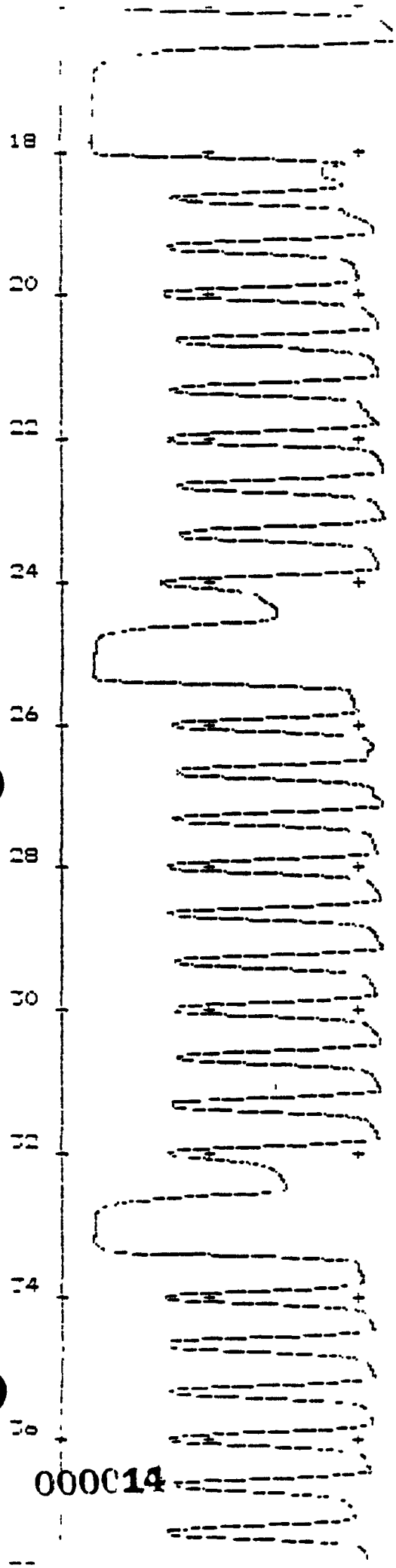
Input Filename: B:NIT.INP
Time: 18:34; Date: 01-07-91
Operator: NEEDHAM

Comment: commercial nitrate with four calibrants

There are 15513600 (bytes) free on disk.
File B:9100705.CHR will take approximately 10640 (bytes).

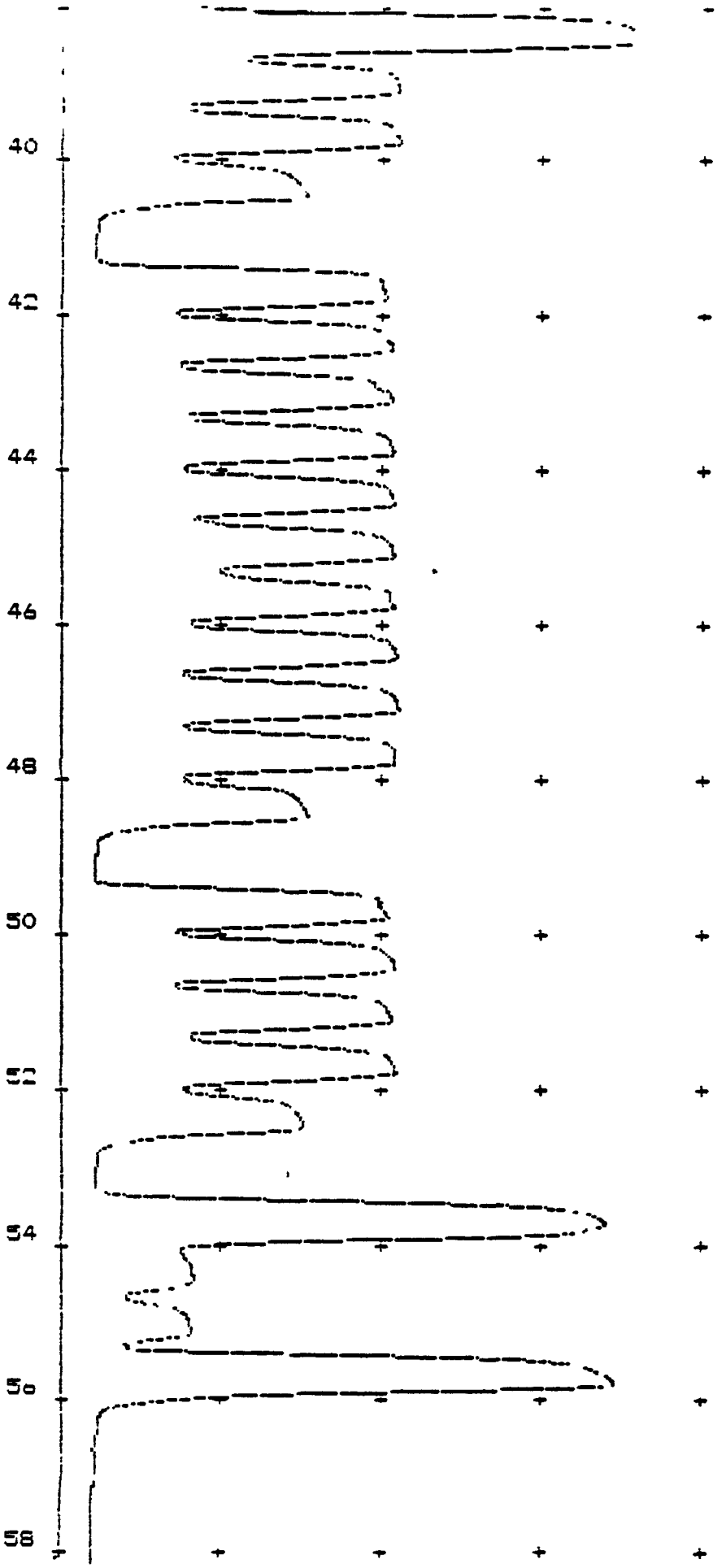


000013



PK	9 CP	9	tvp S	2.026
PK	10 CP	10	tvp S	0.02883 M
PK	11 CP	11	typ S	0.01932 M
PK	12 CP	12	tvp S	1.651 N
PK	13 CP	13	typ S	1.860 N
PK	14 CP	14	typ S	1.761
PK	15 CP	15	typ S	1.891
PK	16 CP	16	tvp S	1.898
PK	17 CP	17	typ S	1.889 N
PK	18 CP	18	typ S	1.928
PK	19 CP	19	typ S	1.929
PK	20 CP	20	typ S	1.898
PK	21 CP	21	typ S	1.232 N
PK	22 CP	22	typ S	0.02646 M
PK	23 CP	23	typ S	1.763
PK	24 CP	24	typ S	1.861
PK	25 CP	25	typ S	1.920 N
PK	26 CP	26	typ S	1.888
PK	27 CP	27	typ S	1.911
PK	28 CP	28	typ S	1.919
PK	29 CP	29	typ S	1.883
PK	30 CP	30	typ S	1.908
PK	31 CP	31	typ S	1.913
PK	32 CP	32	typ S	1.901
PK	33 CP	33	typ S	1.289
PK	34 CP	34	tvp S	0.03123 M
PK	35 CP	35	tvp S	1.798
PK	36 CP	36	typ S	1.869
PK	37 CP	37	typ S	1.870
PK	38 CP	38	tvp S	1.861
PK	39 CP	39	tvp S	1.855
PK	40 CP	40	typ S	1.[illegible]4

000014



PK	42	CP	42	typ	S	2.207
PK	43	CP	43	typ	S	1.868
PK	44	CP	44	typ	S	1.873
PK	45	CP	45	typ	S	1.297
PK	46	CP	46	typ	S	0.02766 M
PK	47	CP	47	typ	S	1.793
PK	48	CP	48	typ	S	1.833
PK	49	CP	49	typ	S	1.827 N
PK	50	CP	50	typ	S	1.833
PK	51	CP	51	typ	S	1.845
PK	52	CP	52	typ	S	1.839
PK	53	CP	53	typ	S	1.839
PK	54	CP	54	typ	S	1.857
PK	55	CP	55	typ	S	1.878
PK	56	CP	56	typ	S	1.849
PK	57	CP	57	typ	S	1.316
PK	58	CP	58	typ	S	0.02766 M
PK	59	CP	59	typ	S	1.806
PK	60	CP	60	typ	S	1.848
PK	61	CP	61	typ	S	1.831
PK	62	CP	62	typ	S	1.851
PK	63	CP	63	typ	S	1.293
PK	64	CP	64	typ	S	0.02646 M
PK	65	CP	65	typ	H	3.121
PK	66	CP	66	typ	L	0.6197
PK	67	CP	67	typ	L	0.6077
PK	68	CP	68	typ	G	3.181
					Last base	162

Time: 18:34: Date: 01-07-91
Operator: NEEDHAM

NO_3/NO_2

Channels 1
Base: 62
Gain: 9

nitrate
Mg/L-N

Base drift correction made
Carryover correction made
Gain drift correction made

	Init base					170	
PK	1	CP	1	typ	P	3.086	Prior
	Rel Abs					0.89	
PK	2	CP	2	typ	C	0.5891	0.62 ppm
PK	3	CP	3	typ	C	1.242	1.24
PK	4	CP	4	typ	C	2.498	2.48
PK	5	CP	5	typ	C	3.091	3.1
PK	6	CP	6	typ	H	3.154	3.1
PK	7	CP	7	typ	L	0.5937	0.62
PK	8	CP	8	typ	L	0.5955	0.62
PK	9	CP	9	typ	S	2.029	ICV 2 ppm (101.5%)
PK	10	CP	10	typ	S	0.02674	M ZCB
PK	11	CP	11	typ	S	0.02334	M PO
PK	12	CP	12	typ	S	1.654	N 9012106-01 2x = 3.308
PK	13	CP	13	typ	S	1.858	N 010 2x = 3.716
PK	14	CP	14	typ	S	1.758	015 2x = 3.516 3.308 ÷ 2 = 1.654 3.516 − 1.654 = 1.862 ÷ 1.55 = 120.1% Spike Recov
PK	15	CP	15	typ	S	1.888	02 2x = 3.776
PK	16	CP	16	typ	S	1.894	03 2x = 3.788
PK	17	CP	17	typ	S	1.886	N 04 2x = 3.772
PK	18	CP	18	typ	S	1.924	05 2x = 3.848
PK	19	CP	19	typ	S	1.924	06 2x = 3.848
PK	20	CP	20	typ	S	1.893	07 2x = 3.786
PK	21	CP	21	typ	S	1.229	N CW 1.24 ppm (99.1%)
PK	22	CP	22	typ	S	0.02833	M CW
PK	23	CP	23	typ	S	1.764	08 2x = 3.528
PK	24	CP	24	typ	S	1.856	09 2x = 3.712
PK	25	CP	25	typ	S	1.915	N 10 2x = 3.830
PK	26	CP	26	typ	S	1.882	11 2x = 3.764
PK	27	CP	27	typ	S	1.905	12 2x = 3.810
PK	28	CP	28	typ	S	1.913	13 2x = 3.826
PK	29	CP	29	typ	S	1.877	14 2x = 3.754
PK	30	CP	30	typ	S	1.902	15 2x = 3.804
PK	31	CP	31	typ	S	1.906	16 2x = 3.812
PK	32	CP	32	typ	S	1.894	17 2x = 3.788
PK	33	CP	33	typ	S	1.285	CW 1.24 ppm (103.9%)
PK	34	CP	34	typ	S	0.03448	M CW
PK	35	CP	35	typ	S	1.796	18 2x = 3.592
PK	36	CP	36	typ	S	1.862	19 2x = 3.724
PK	37	CP	37	typ	S	1.862	20 2x = 3.724
PK	38	CP	38	typ	S	1.853	9012109-01 2x = 3.706
PK	39	CP	39	typ	S	1.846	010 2x = 3.692
PK	40	CP	40	typ	S	1.736	015 2x = 3.472 3.706 ÷ 2 = 1.853 3.472 − 1.853 = 1.619 ÷ 1.55 = 104.5% Spike Recov
PK	41	CP	41	typ	S	1.833	02 2x = 3.666
PK	42	CP	42	typ	S	3.288	03 Straight
PK	43	CP	43	typ	S	1.854	04 2x = 3.708
PK	44	CP	44	typ	S	1.863	05 2x = 3.726
PK	45	CP	45	typ	S	1.291	CW 1.24 ppm (104.1%)
PK	46	CP	46	typ	S	0.03247	M CW
PK	47	CP	47	typ	S	1.789	06 2x = 3.578
PK	48	CP	48	typ	S	1.823	07 2x = 3.646
PK	49	CP	49	typ	S	1.817	N 08 2x = 3.634
PK	50	CP	50	typ	S	1.824	09 2x = 3.648
PK	51	CP	51	typ	S	1.834	10 2x = 3.668
[illegible]						[illegible]	2x = 3.656

000016

PK	54	CP	54	typ	S	1.845 13 2x = 3.690
PK	55	CP	55	typ	S	1.863 14 2x = 3.730
PK	56	CP	56	typ	S	1.837 15 2x = 3.674
PK	57	CP	57	typ	S	1.309 CW 1.24 PPM (105.6 %)
PK	58	CP	58	typ	S	0.00398 MCLB
PK	59	CP	59	typ	S	1.799 16 2x = 3.598
PK	60	CP	60	typ	S	1.835 17 2x = 3.670
PK	61	CP	61	typ	S	1.818 18 2x = 3.636
PK	62	CP	62	typ	S	1.838 19 2x = 3.676
PK	63	CP	63	typ	S	1.285 CW 1.24 PPM (103.6 %)
PK	64	CP	64	typ	S	0.00365 MCLB
PK	65	CP	65	typ	H	0.098
PK	66	CP	66	typ	L	0.6151
PK	67	CP	67	typ	L	0.6107
PK	68	CP	68	typ	G	0.154
Last base						162

NO_3/NO_2

Sample statistics

Anal	level	cups	avg	std dev	cv
1	all	56	1.598	0.653	41%

Anal 1: linear fit
Carryover factor: 0.30%.

Chart saved to file B:9100705.CHR.

text file B:9100705.TXT has been saved to disk.

000017

SKINNER & SHERMAN LABORATORIES

TRAACS 800 SYSTEM BENCH SHEET
GENERAL ANALYSIS

DATE: 1/7/91
ANALYST: [illegible]
METHOD:

Chloride 325.2

RUN ID'S		WORKORDER
91007	- 02	9012106
	-	9012109
	-	9012029
	-	9012143
	-	9012150
	-	9012169

STANDARDS:	NAME	SOURCE	PREPARED
ICV	P987	(52.1 ppm)	9012177
CCV	50 ppm		9012215
ICB/CCB			9012217

POS	LAB ID	SAMPLE ID	COMMENTS
01	Prep		
02	50ppm		
03	25		
04	50		
05	75		
06	100		
07	100		
08	3		
09	3		
10	CCV/LCS		
11	ICB		
12	Pb		
13	9012106-01		
14		01D	
15		01S	
16		02	
17		03	
18		04	
19		05	
20		06	
21		BLANK	
22	CCV		
23	CCB		
24		07	
25		08	
26		09	
27		10	
28		11	
29		12	
30		13	
31		14	
32		15	
33		16	
34	CCV		
35	CCB		

relabs 0.7200

Spike = Inc sample Plus Inc 50ppm Thus 25ppm

84

SKINNER & SHERMAN LAB
TRAACS BENCH SHEET
DATE: 1/7/91

RUN ID: 90007

POS	LAB ID	SAMPLE ID	COMMENTS
36	17		
37	18		
38	19		
39	20		
40	9012109-01		
41	01D		
42	01S		
43	02		
44	03		
45	Blank		
46	CCV		
47	CCB		
48	04		
49	05		
50	06		
51	07		
52	08		
53	09		
54	10		
55	11		
56	12		
57	Blank		
58	CCV		
59	CCB		
60	13		
61	14		
62	15		
63	16		
64	17		
65	18		
66	19		
67	9012079-01		
68	02		
69	~~Blank~~ 02D		
70	CCV		
71	CCB		
72	~~9012140-02~~ 02S		
73	9012143-01		
74	9012150-01		
75	02		
76	9012169-01		
77	02		
78	03		
79	04		
80	05		
81	~~Blank~~ 9012140-02		
82	CCV		
83	CCB		
84	9012177-01		
85	02		

000019

SKINNER & SHERMAN LAB
TRAACS BENCH SHEET
DATE: 1/7/91

RUN ID: 91007

	POS	LAB ID	SAMPLE ID	COMMENTS
86	~~36~~	9012213-01		
87	~~37~~	9012217-02		
88	~~38~~		C3	
89	~~39~~		C4	
90	~~40~~		C5	
91	~~41~~		BLANK	
92	~~42~~	CLC		
93	~~43~~	CLB		
	44			
	45			
	46			
	47			
	48			
	49			
	50			
	51			
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DW 1/7/91

000020

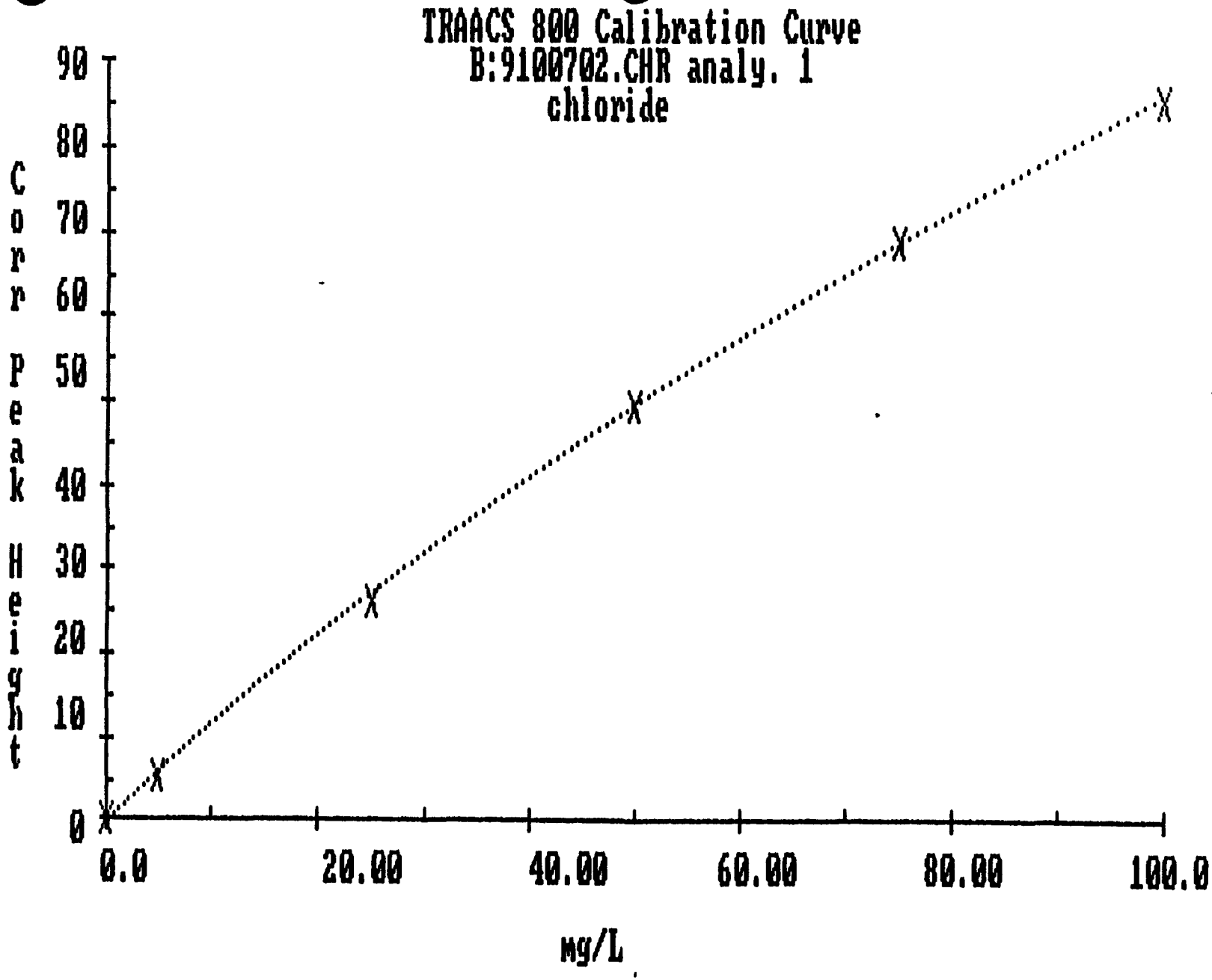
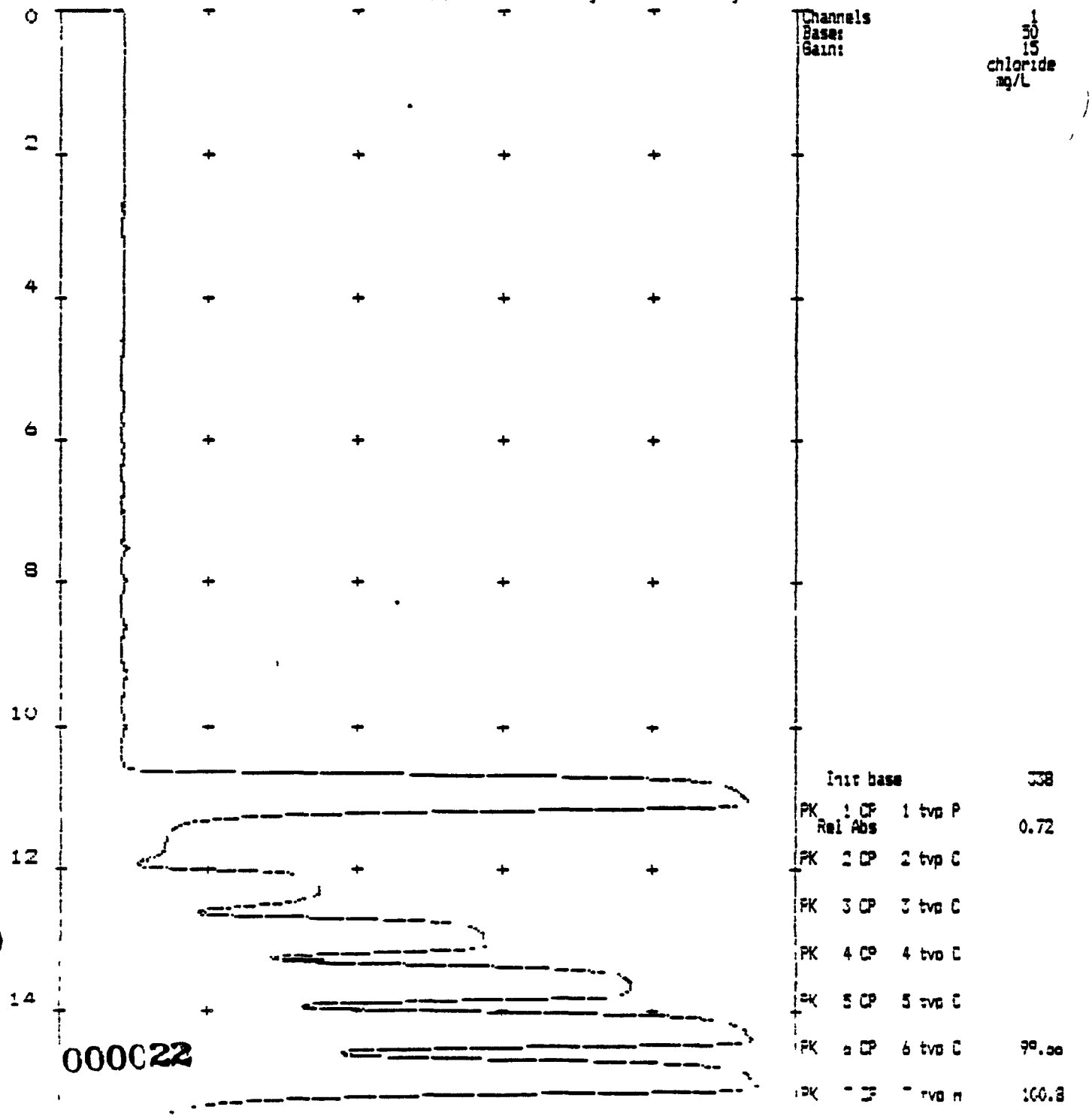

TRAACS 800 Calibration Curve
B:9100702.CHR analy. 1
chloride
Corr Peak Height
90
80
70
60
50
40
30
20
10
0
0.0
20.00
40.00
60.00
80.00
100.0
mg/L

Chart minimum: 0%, maximum 100%
Active analyses: 1

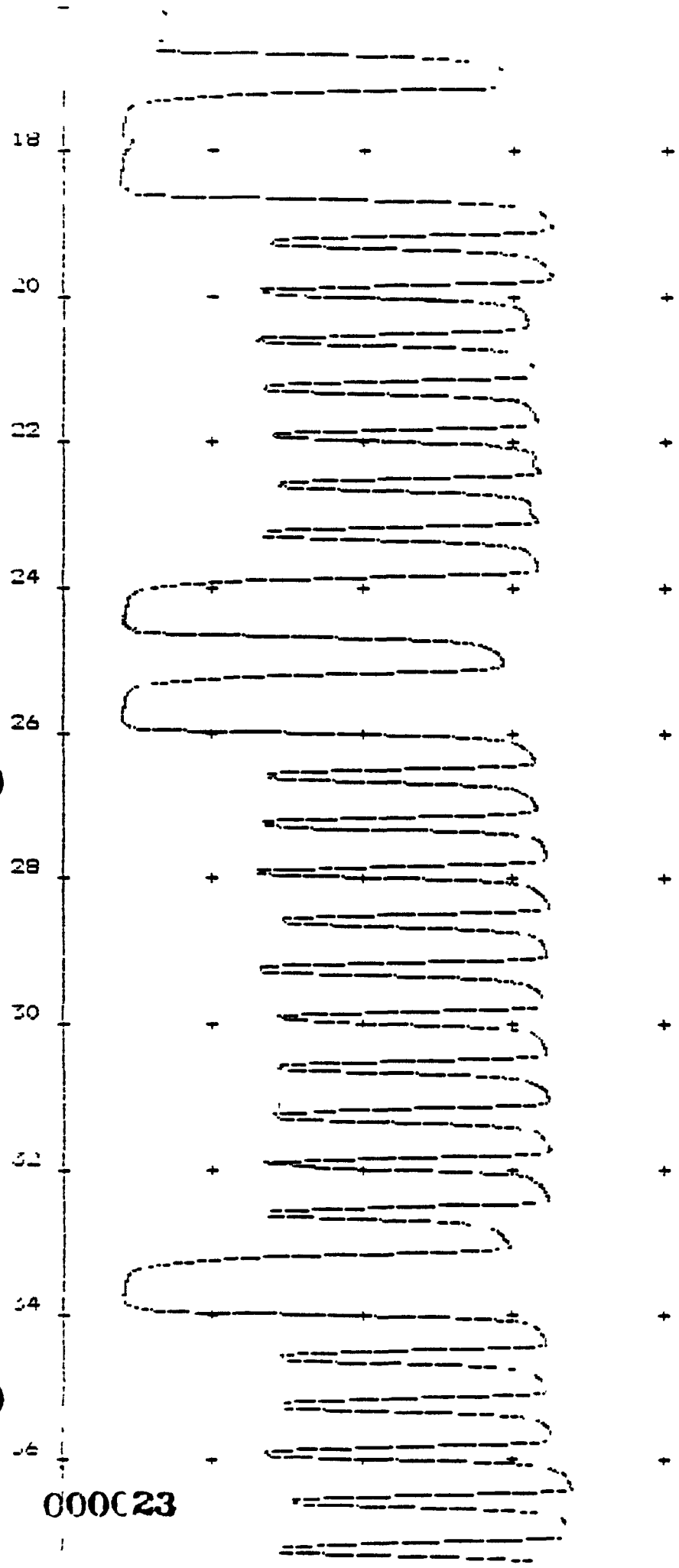
Input Filename: B:CHLOR.INP
Time: 10:25; Date: 01-07-91
Operator: NEEDHAM

Comment: commercial chloride with five calibrants

There are 15548416 (bytes) free on disk.
File B:9100702.CHR will take approximately 14120 (bytes).

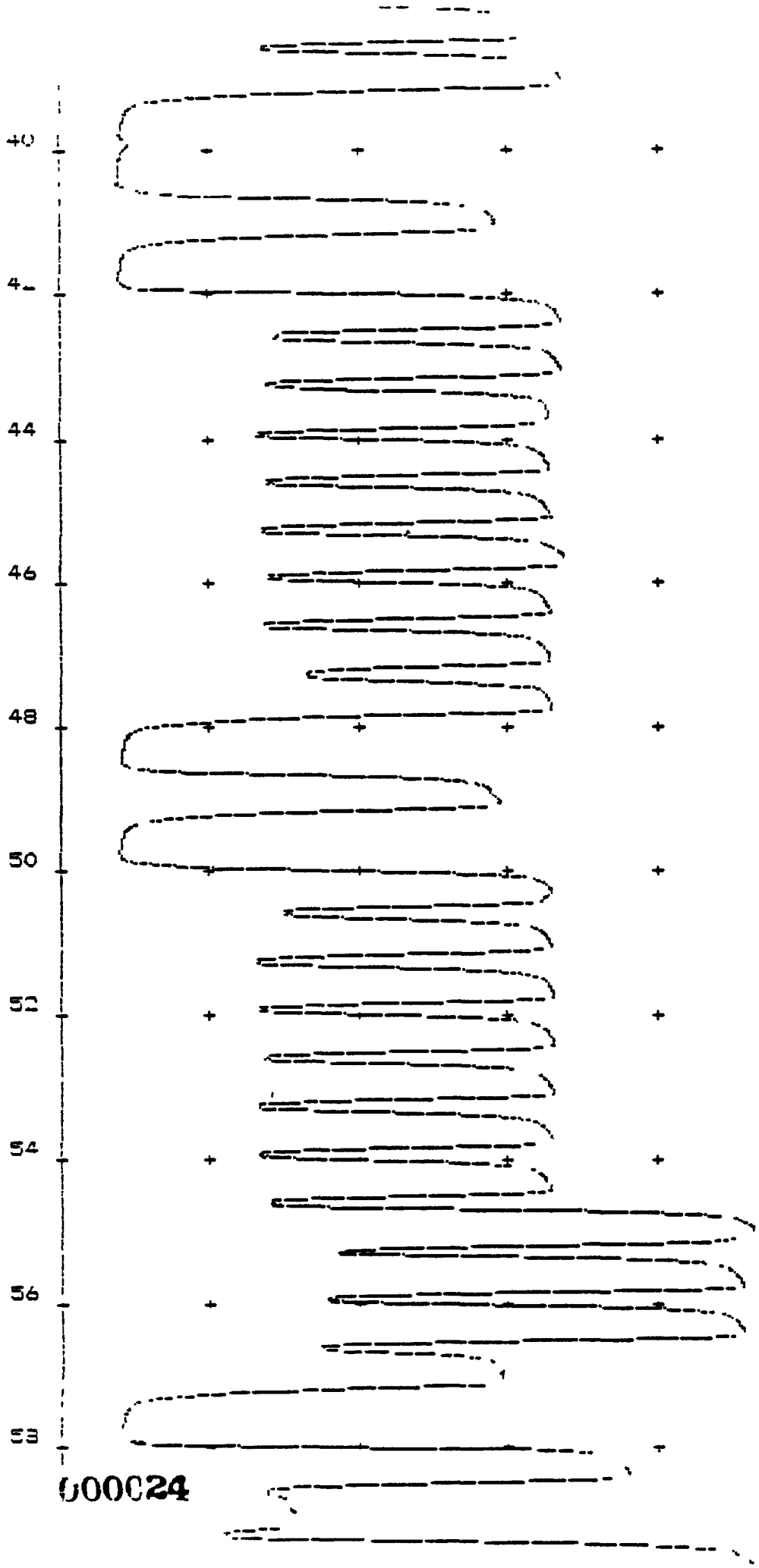


000022



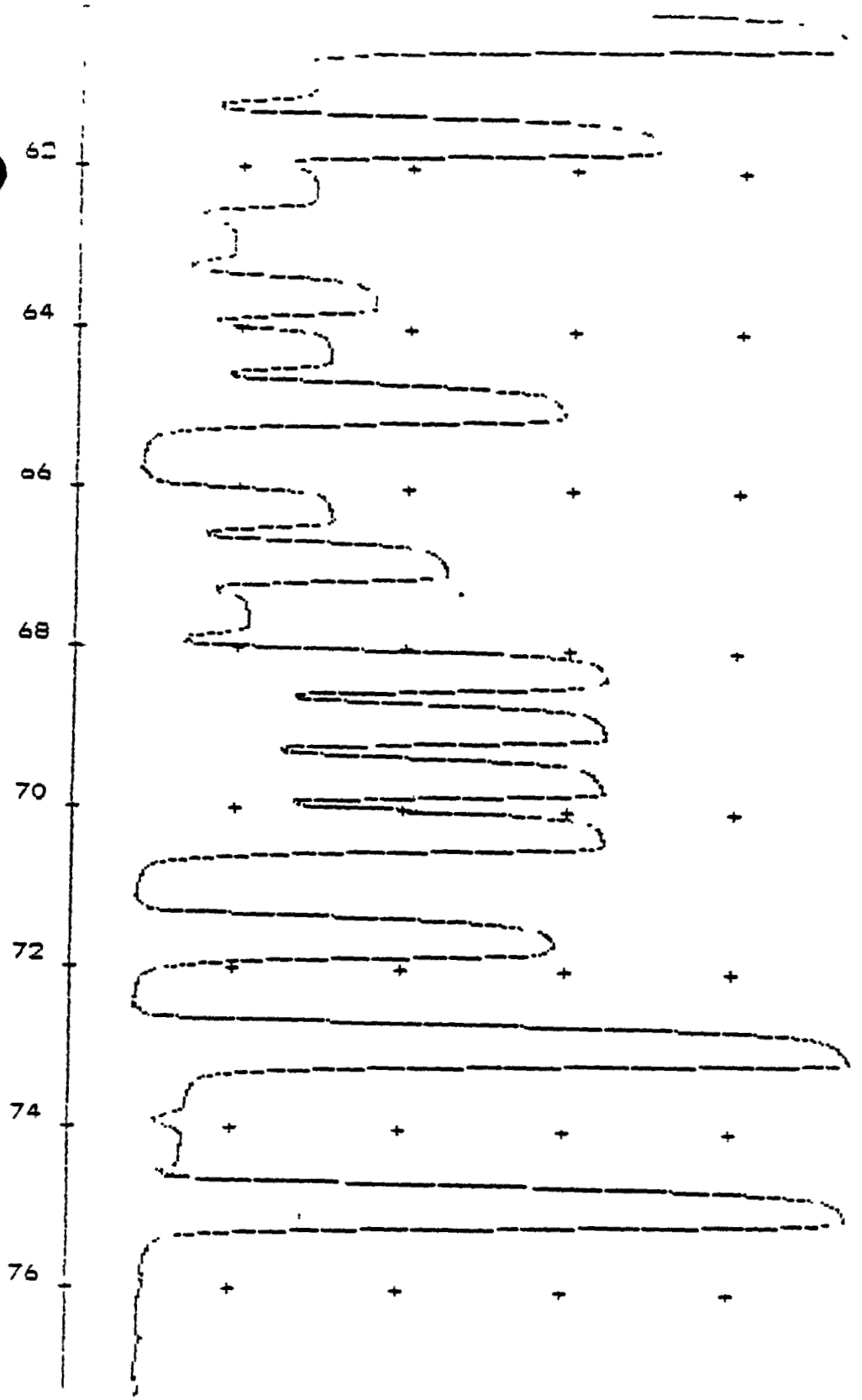
PK	9	CP	9	typ S	1.73
PK	10	CP	10	typ S	51.37
PK	11	CP	11	typ S	-0.06808 M
PK	12	CP	12	typ S	-0.2220 M
PK	13	CP	13	typ S	59.09
PK	14	CP	14	typ S	59.15
PK	15	CP	15	typ S	55.09
PK	16	CP	16	typ S	56.51
PK	17	CP	17	typ S	56.60
PK	18	CP	18	typ S	57.09
PK	19	CP	19	typ S	56.66
PK	20	CP	20	typ S	56.85
PK	21	CP	21	typ S	0.08622 M
PK	22	CP	22	typ S	51.06
PK	23	CP	23	typ S	-0.02953 M
PK	24	CP	24	typ S	56.51
PK	25	CP	25	typ S	56.60 M
PK	26	CP	26	typ S	58.49
PK	27	CP	27	typ S	58.74
PK	28	CP	28	typ S	58.46
PK	29	CP	29	typ S	58.46
PK	30	CP	30	typ S	58.34
PK	31	CP	31	typ S	58.96
PK	32	CP	32	typ S	59.06
PK	33	CP	33	typ S	58.74 N
PK	34	CP	34	typ S	52.11
PK	35	CP	35	typ S	0.08622 M
PK	36	CP	36	typ S	58.59
PK	37	CP	37	typ S	58.59
PK	38	CP	38	typ S	59.71
PK	39	CP	39	typ S	62.67
PK	40	CP	40	typ S	62.72

000023



PK	43	CP	43	typ	S	51.77
PK	44	CP	44	typ	S	0.1523 M
PK	45	CP	45	typ	S	-0.1451 M
PK	46	CP	46	typ	S	50.64
PK	47	CP	47	typ	S	0.04761 M
PK	48	CP	48	typ	S	61.50
PK	49	CP	49	typ	S	61.99
PK	50	CP	50	typ	S	59.75
PK	51	CP	51	typ	S	59.90
PK	52	CP	52	typ	S	59.73
PK	53	CP	53	typ	S	62.69
PK	54	CP	54	typ	S	60.06
PK	55	CP	55	typ	S	59.81 M
PK	56	CP	56	typ	S	60.12
PK	57	CP	57	typ	S	0.1635 M
PK	58	CP	58	typ	S	51.33
PK	59	CP	59	typ	S	0.04761 M
PK	60	CP	60	typ	S	60.03
PK	61	CP	61	typ	S	60.22
PK	62	CP	62	typ	S	60.53
PK	63	CP	63	typ	S	60.66
PK	64	CP	64	typ	S	60.56
PK	65	CP	65	typ	S	60.44
PK	66	CP	66	typ	S	60.15
PK	67	CP	67	typ	S	98.64
PK	68	CP	68	typ	S	96.72
PK	69	CP	69	typ	S	96.58
PK	70	CP	70	typ	S	51.90
PK	71	CP	71	typ	S	0.2473 M
PK	72	CP	72	typ	S	70.84
PK	73	CP	73	typ	S	21.77

000024



PK	75 CP	75 typ S	[illegible]
PK	76 CP	76 typ S	[illegible]
PK	77 CP	77 typ S	25.55
PK	78 CP	78 typ S	16.26
PK	79 CP	79 typ S	9.318
PK	80 CP	80 typ S	25.44
PK	81 CP	81 typ S	20.22
PK	82 CP	82 typ S	51.48
PK	83 CP	83 typ S	0.1248 M
PK	84 CP	84 typ S	29.63
PK	85 CP	85 typ S	35.22
PK	86 CP	86 typ S	11.20
PK	87 CP	87 typ S	58.37
PK	88 CP	88 typ S	58.43
PK	89 CP	89 typ S	58.21
PK	90 CP	90 typ S	58.34
PK	91 CP	91 typ S	0.1442 M
PK	92 CP	92 typ S	50.97
PK	93 CP	93 typ S	0.08622 M
PK	94 CP	94 typ H	100.9
PK	95 CP	95 typ L	5.198
PK	96 CP	96 typ L	4.868
PK	97 CP	97 typ B	100.7

Last base 365

Time: 17:26: Date: 01-07-91
Operator: NEEDHAM

Comment: commercial chloride with five calibrants

Channels 1
Base: 000025 50
Gain: 15

chloride

Base drift correction made
Carryover correction made
Gain drift correction made

Init base						ICB	
PK	1	CP	1	typ	P	99.22	PMES
Fel Abs						0.72	
PK	2	CP	2	typ	C	4.777	5.0 ppm DB 1/7/91
PK	3	CP	3	typ	C	24.45	25
PK	4	CP	4	typ	C	50.23	50
PK	5	CP	5	typ	C	75.48	75
PK	6	CP	6	typ	C	99.66	100
PK	7	CP	7	typ	H	100.7	100
PK	8	CP	8	typ	L	4.697	5
PK	9	CP	9	typ	L	4.812	5
PK	10	CP	10	typ	S	51.75	ICV 521 (99.3%)
PK	11	CP	11	typ	S	-0.1420	M ICB
PK	12	CP	12	typ	S	-0.1799	M Pb
PK	13	CP	13	typ	S	59.18	9012106-01
PK	14	CP	14	typ	S	59.02	01D
PK	15	CP	15	typ	S	54.94	01S 59.18/2 = 29.59 54.94-29.59 = 25.35 ÷ 25 = 101.4 % Spike Recovery
PK	16	CP	16	typ	S	56.37	02
PK	17	CP	17	typ	S	56.45	03
PK	18	CP	18	typ	S	56.94	04
PK	19	CP	19	typ	S	56.50	05
PK	20	CP	20	typ	S	56.69	06
PK	21	CP	21	typ	S	-0.05020	M Blank
PK	22	CP	22	typ	S	51.08	CCV (102.1 %)
PK	23	CP	23	typ	S	-0.1647	M CCB
PK	24	CP	24	typ	S	56.54	09
PK	25	CP	25	typ	S	56.41	N 08
PK	26	CP	26	typ	S	58.31	09
PK	27	CP	27	typ	S	58.55	10
PK	28	CP	28	typ	S	58.26	11
PK	29	CP	29	typ	S	58.26	12
PK	30	CP	30	typ	S	58.13	13
PK	31	CP	31	typ	S	58.75	14
PK	32	CP	32	typ	S	58.84	15
PK	33	CP	33	typ	S	58.52	N 16
PK	34	CP	34	typ	S	51.86	CCV (103.7 %)
PK	35	CP	35	typ	S	-0.1139	M CCB
PK	36	CP	36	typ	S	58.57	17
PK	37	CP	37	typ	S	58.35	18
PK	38	CP	38	typ	S	59.47	19
PK	39	CP	39	typ	S	62.45	20
PK	40	CP	40	typ	S	62.47	9012109-01
PK	41	CP	41	typ	S	62.05	01D
PK	42	CP	42	typ	S	56.69	01S 62.43/2 = 31.24 % 56.69-31.24 = 25.45/25 = 101.8 % Spike Rec.
PK	43	CP	43	typ	S	61.52	02
PK	44	CP	44	typ	S	-0.08267	M 03
PK	45	CP	45	typ	S	-0.2752	M Blank
PK	46	CP	46	typ	S	50.54	CCV (101.1 %)
PK	47	CP	47	typ	S	-0.2119	M CCB
PK	48	CP	48	typ	S	61.74	04
PK	49	CP	49	typ	S	61.60	05
PK	50	CP	50	typ	S	59.44	06
PK	51	CP	51	typ	S	59.60	07
PK	52	CP	52	typ	S	59.62	08
PK	53	CP	53	typ	S	62.39	09
PK	54	CP	54	typ	S	59.73	10
PK	55	CP	55	typ	S	59.49	N 11
PK	56	CP	56	typ	S	59.80	12
PK	57	CP	57	typ	S	-0.1664	M Blank
PK	58	CP	58	typ	S	51.17	CCV (102.3 %)
PK	59	CP	59	typ	S	-0.2755	M CCB
PK	60	CP	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]

PK	62	CP	62	typ	S	60.18	15
PK	63	CP	63	typ	S	60.30	16
PK	64	CP	64	typ	S	60.21	17
PK	65	CP	65	typ	S	60.07	18
PK	66	CP	66	typ	S	59.78	19
PK	67	CP	67	typ	S	98.69	9012029-01
PK	68	CP	68	typ	S	96.43	02
PK	69	CP	69	typ	S	96.28	02D
PK	70	CP	70	typ	S	51.38	CW (102.8)
PK	71	CP	71	typ	S	-0.1470	M CW3
PK	72	CP	72	typ	S	73.74	02S 96.45/2 = 48.22 73.74-48.22 = 25.52/25 = 102.1% Spike Recovery
PK	73	CP	73	typ	S	20.55	9012145-01
PK	74	CP	74	typ	S	99.20	N 9012150-01
PK	75	CP	75	typ	S	97.37	02
PK	76	CP	76	typ	S	17.07	9012169-01
PK	77	CP	77	typ	S	65.30	02
PK	78	CP	78	typ	S	17.74	03
PK	79	CP	79	typ	S	8.921	04
PK	80	CP	80	typ	S	25.06	05
PK	81	CP	81	typ	S	19.78	9012140-02
PK	82	CP	82	typ	S	51.12	CW (102.2%)
PK	83	CP	83	typ	S	-0.3238	M CW3
PK	84	CP	84	typ	S	20.25	9012177-01
PK	85	CP	85	typ	S	34.79	02
PK	86	CP	86	typ	S	10.71	~~9012219~~-9012213-01
PK	87	CP	87	typ	S	58.06	9012217-02
PK	88	CP	88	typ	S	57.95	03
PK	89	CP	89	typ	S	57.72	04
PK	90	CP	90	typ	S	57.85	05
PK	91	CP	91	typ	S	-0.3591	M Blank
PK	92	CP	92	typ	S	50.64	CW (101.3%)
PK	93	CP	93	typ	S	-0.4132	M CW3
PK	94	CP	94	typ	H	100.9	
PK	95	CP	95	typ	L	4.565	
PK	96	CP	96	typ	L	4.434	
PK	97	CP	97	typ	G	100.7	
Last base						365	

Sample statistics

Anal	level	cups	avg	std dev	cv
1	all	84	46.69	26.7	57%

Anal 1: quadratic fit
Carryover factor: 0.30%.

Chart saved to file B:9100702.CHR.

te t file B:9100702.TXT has been saved to disk.

DFC

Alkalinity STD methods 4031A 12.20.90

To pH 4.5 # 9012106

standardization of H_2SO_4

Ref. Scotts STD methods of Chem Analysis

vol. II page 2194

$$\frac{0.4266g\ Na_2CO_3}{40.3 \times 0.053} = 0.0199N\ H_2SO_4$$

ICV 12106-01 19.7 12106-02 19.1

1.30 0.00 0.00

0.00 19.7mL 19.1mL

1.30mL

12106-03 19.9 12106-04 19.8 12106-05 19.7

0.00 0.00 0.00

19.9mL 19.8mL 19.7mL

12106-06 19.4 12106-07 19.4 12106-08 19.3

0.00 0.00 0.00

19.4mL 19.4mL 19.3mL

12106-09 18.6 12106-10 18.4 12106-11 18.9

0.00 0.00 0.00

18.6mL 18.4mL 18.9mL

12106-12 18.2 12106-13 19.4 12106-14 18.9

0.00 0.00 0.00

18.2mL 19.4mL 18.9mL

12106-15 19.0 12106-16 19.2 12106-17 19.6

0.00 0.00 0.00

19.0mL 19.2mL 19.6mL

12106-18 19.2 12106-19 18.8 12106-20 21.2

0.00 0.00 0.00

19.2mL 18.8mL 21.2mL

12106-20D 21.3

0.00

21.3mL

Sample #	pH	Result
9012106-01	7.35	392.03
-02	7.55	380.09
-03	7.63	396.01
-04	7.87	394.02
-05	7.57	392.03
-06	7.97	386.06
-07	7.56	386.06
-08	7.79	384.07
-09	7.45	370.14
-10	7.87	366.16
-11	7.45	376.11
-12	7.88	362.18
-13	7.43	386.06
-14	7.93	376.11
-15	7.59	378.10
-16	7.90	382.08
-17	7.61	390.04
-18	8.01	382.08
-19	~~10~~ DFC 7.56	374.12
-20	7.92	421.88
ICV/LCS (WP987)	TRUE VAL 27.0	25.87
-20D		423.9 mg $CaCO_3$/L

Calculation:

X mL titrant x 0.0199N x 50000mg

Sample vol. = 50mL

Result = mg ($CaCO_3$/L)

Bob Bennett

Fluoride

PROCEDURE: Add 5 mls sample to cup
Add 5 mls buffer soln
Stir one minute and read

Sample/STD		MV	Results (mg/L)	
0ppm		368		
1.0		293		
5.0		252	r = 0.9999	
10.0		233		
ICV/LCS	2.5 Dil	~~297~~ 292	1.046	True value 1.0 limits ~~0.87~~ 0.89 - 1.08
ICB		~~365~~	< 1	
Pb		367	< 1	
9012106-01		291	1.09	1.09 ÷ 2 = .545
	010	297	< 1 → 0.86	2.85 - .545 = 2.305
	015	266	2.85	2.305 ÷ 2.5 = 92.2% Spike Recov
	02	293	1.01	
	03	292	1.05	Spike 2.5 ml 5ppm
	04	292	1.05	Plus 2.5 ml sample
	05	293	1.01	Spiked at 2.5 ppm
	06	293	1.01	
	07	293	1.01	
CCV (5PPM)		253	4.70	(94.0%)
CCB		360	< 1	
	08	294	< 1	
	09	293	1.01	
	10	296	< 1	
	11	293	1.01	
	12	296	< 1	
	13	295	< 1	
	14	302	< 1	
	15	296	< 1	
	16	297	< 1	
	17	296	< 1	
CCV SPAN		252	4.89	(97.8%)
CCB		363	< 1	
	18	297	< 1	
	19	296	< 1	

Fluoride Cont.

Sample/STD	MU	Result (mg/L)	
20	296	< 1	
9012109-01	294	< 0.97	
01D	294	< 0.97	
01S	267	2.74	.97÷2=.485 2.74−.485=2
02	293	1.01	2.255÷25=90.29
03	294	<	
04	293	1.01	
05	295	<	
CCV SPIKE	252	4.89	(97.8%)
CCB		<	
06	293	1.01	
07	294	<	
08	294	<	
09	295	<	
10	294	<	
11	293	1.01	
12	293	1.01	
13	293	1.01	
14	294	<	
15	295	<	
CCV SPIKE	253	4.70	(94.0%)
CCB	362	<	
16	293	1.01	
17	294	<	
18	294	<	
19	293	1.01	
9011281-02	293	1.01	
03	293	1.01	
04	292	1.05	
05	292	1.05	
9012117-02	345	<	
9012140-01	358	<	
CCV SPIKE	253	4.70	(94.0%)
CCB	359	<	
9012177-01	359	<	
000030 02	361	<	

Spike 2.5ml S
25ml Si
Spikedat
Spike Recov

Sample/STD	mV	Result (mg/L)	
S012217-02	294	<	
03	293	1.01	
04	294	<	
05	293	1.01	
CCV (5PPM)	255	4.35	(87.0%)
CCB	361	<	

pH

8 10/11/90

Calibrated at pH=4 and pH=7

9012105

	pH
01	7.31
02	7.58
03	7.59
04	7.82
05	7.62
06	7.93
07	7.51
08	7.61
09	7.41
10	7.52
11	7.52
12	7.83
13	7.49
14	7.90
15	7.64
16	7.84
17	7.69
18	7.89
19	7.62
20	7.97

[SULFATES] BY STANDARD METHODS 426C — JON S. THOMAS

1/7/91

① 20 mls of Buffer
② add $BaCl_2$ & Stir 1 min
③ after 6 min read @ 420 nm

Sample/STD	sample vol.	abs w/o Back	abs w/ Back	Result
0	100 ml	0.000	0.000	
5 ppm			0.000	
10 ppm			0.019	
15 ppm			0.039	
30 ppm			0.115	
40 ppm			0.171	
			~~0.000~~ JST	
CS/ICV (20 ppm)		0.067	~~0.000~~ JST	18.5 (93%)
CCB			0.000	0
PB			0.000	0
9012106-01	50 ml	0.000	0.096	25.1 (x2) = 50.2
-02			0.097	25.3 (x2) = 50.6
-03			0.105	27.1 (x2) = 54.2
-04			0.098	25.6 (x2) = 51.2
-05			0.070	19.2 (x2) = 38.4
-06			0.076	20.6 (x2) = 41.2
-07			0.115	29.4 (x2) = 58.8
-08			0.123	31.2 (x2) = 62.4
-08D			0.121	30.7 (x2) = 61.4
CCV (25 ppm)	100 ml		0.098	25.6
CCB	100 ml		0.000	0
-08-S	25 ml		0.102	26.4 (x4) = 105.6
-09	50 ml		0.095	24.9 (x2) = 49.8
-10			0.084	22.4 (x2) = 44.8
-11			0.091	24.0 (x2) = 48.0
-12			0.071	19.5 (x2) = 39.0
-13			0.074	20.1 (x2) = 40.2
-14			0.074	20.1 (x2) = 40.2
-15			0.075	20.4 (x2) = 40.8

[SULFATES: cont.] BY STANDARD METHODS 426C JANET THOMAS
1/7/91

Sample/STD	sample vol	Abs w/o Barb	Abs w/Barb	Result
9012106-17	50ml	0.000	0.092	24.2 (x2)=48.4
~~-18 SST~~				
CCV (10ppm)	100ml		0.029	9.96 (99.6%)
CCB	100ml		0.000	0
-18	50ml		0.073	19.9 (x2)=39.8
-19			0.091	24.0 (x2)=48.0
-20			0.086	22.8 (x2)=45.6
9012109-01	50ml		0.087	23.1 (x2)=46.2
-02			0.079	21.2 (x2)=42.4
-03			0.075	20.4 (x2)=40.8
-04			0.081	21.7 (x2)=43.4
-05			0.082	21.9 (x2)=43.8
-06			0.101	26.2 (x2)=52.4
-07			0.108	27.8 (x2)=55.6
CCV (5ppm)	100ml		0.010	5.6
CCB	100ml		0.000	0
-08	50ml		0.085	22.6 (x2)
-08D			0.085	22.6 (x2) =45.2
-08S (5ppm)			0.104	26.9 (x2)=53.8
-09			0.097 ~~0.98~~	25.3 (x2)=50.6
-10			0.083	22.2 (x2)=44.4
-11			0.080	21.4 (x2)=42.8
-12			0.078	25.6 (x2)=51.2
-13			0.094	24.6 (x2)=49.2
-14			0.102	26.5 (x2)=53.0
-15			0.099	25.8 (x2)=51.6
-16			0.079	21.2 (x2)=42.4
-17			0.082	21.9 (x2)=43.8
CCV (30ppm)	100ml		0.124	31.4
CCB	100ml		0.000	0
0001.34 -18	50ml		0.078	21.0 (x2)=42.0
-19	50ml		0.087	23.0 (x2)=46.0

[SULFITES cont.] BY STANDARD METHODS 426C JOHN E THOMAS

sample	sample vol	abs. w/o Bach	abs. w/ Bach	Result	Qc
9012286-22	50 ml	0.000	0.150	37.3 (x2) = 74.6	
CCV (25ppm)	100ml	0.000	0.093	24.4	(97.6%)
CCB	100ml	0.000	0.000	0	—
-23	10ml	0.000	0.030	10.2 (x10) = 102.0	
-24	50ml		0.084	22.4 (x2) = 44.8	
-24D	50ml		0.083	22.2 (x2) = 44.4	
(10ppm) -24S	50ml		0.170	41.8 (x2) = 83.6	
-25	25ml		0.073	19.9 (x4) = 79.6	
9012288-01	25ml		0.083	22.2 (x4) = 888	
02	100ml		0.002	<5ppm	
03	50ml		0.165	40.7 (x2) = 81.4	
04	50ml		0.086	22.8 (x2) = 45.6	
05	25ml		0.103	26.7 (x4) = 106.8	
9011263-01	50ml		0.112	28.7 (x2) = 57.4	

NEEDHAM
JANUARY 8, 1991

Specific Conductance

Sample #	ohmos	mult	Cell constant	temp	Result ohmos/cm
LCS/JCV WP987	2500	10	0.01	20°C	285.71 - 9
ICB	890	0.1		20°C	1.02
PB	895	0.1			1.02
9012106-01	840	100			960.0
010	840	100			960.0
02	840	100			960.0
03	830	100			948.6
04	835	100			954.3
05	840	100			960.0
06	830	100			948.6
07	835	100			~~9~~954.3
08	835	100			954.3
09	840	100			960.0
10	840	100			960.0
11	840	100			960.0
12	835	100			954.3
13	840	100			960.0
14	840	100			960.0
15	835	100			954.3
16	840	100			960.0
17	840	100			960.0
18	830	100			948.6
19	830	100			948.6
20	840	100			960.0
9012109-01	835	100			954.3
010	835	100			954.3
02	880	100			1005.7
03	835	100			954.3
04	830	100			948.6
05	810	100			925.7
06	840	100			960.0
07	840	100			960.0
08	840	100			960.0
09	840	100			960.0

NEEDHAM
JANUARY 8, 1991

Specific Conductance cont.

Sample #	uhmos	mult	Cellconstant	temp	Result uhmos/cm
9012109-10	840	100	0.01	20°C	960.0
11	820	100			937.1
12	835	100			954.3
13	830	100			948.6
14	890	100			1017.1
15	840	100			960.0
16	860	100			982.9
17	810	100			925.7
18	890	100			1017.1
19	820	100			937.1
9012140-01	1155	10			~~93~~ 132.0
9012143-01	1160	10			132.6
WP 567	~~2500~~ 2490	10			
Blank	880	0.1			

Calculation:

$$\text{uhmos} \times \text{mult} \times \underset{\text{Cellconstant}}{0.01} \div \underset{.895}{1 + 0.025(T-25)}$$

Weedsport NOR

9012106 12/13/90

TSS	TDS @ 180°C
01B 300ml's	100ml's
17.7016	46.8560
(3) 17.7015	46.7975
0.0001 <3.3	0.0585
$0.1 \times \frac{1000}{300}$ = 0.33 mg/L ✓	$58.5 \times \frac{1000}{100}$ = 585 mg/L ✓
02B 300ml's	100ml's
19.6512	52.3360
(9) 19.6510	52.2755
0.0002 <3.3	0.0605
$0.2 \times \frac{1000}{300}$ = 0.67 mg/L ✓	60.5 × 10 = 605 mg/L ✓
03B 300ml's	100ml's
17.7329	53.8260
(33) 17.7328	53.7675
0.0001 <3.3	0.0585
$0.1 \times \frac{1000}{300}$ = 0.33 mg/L ✓	58.5 × 10 = 585 mg/L ✓
04B 300ml's	100ml's
17.5290	50.8448
(44) 17.5288 <3.3	50.7865
0.0002 ✓	0.0580
$0.2 \times \frac{1000}{300}$ = 0.67 mg/L	58.0 × 10 = 580 mg/L
05B 300ml's	100ml's
16.4684	51.1120
(46) 16.4682	51.0530
0.0002 ✓ <3.3	0.0590
$0.2 \times \frac{1000}{300}$ = 0.67 mg/L	59.0 × 10 = 590 mg/L ✓

Woodward Nor

90 12 06	12/13/90
TSS	TDS @ 180
06B 3ccml's	1ccml's
17.9633	51.0450
(46) 17.9632	50.9860
0.0001	0.0590
<3.3	
0.1 x 1000/30 = 0.33 mg/L ✓	59.0 x 10 = 590 mg/L ✓
02B 1ccml's Filters very slowly	1ccml's
17.0776	52.8435
(56) 17.0775	52.7920
0.0001	0.0515
0.1 x 1000/100 = 10 mg/L ✓	51.5 x 10 = 515 mg/L ✓
(51) 17.0775 <3.3	
08B 1ccml's Filters very slowly	1ccml's
18.1141	51.2455
(54) 18.1140	51.1945
0.0001	0.0510
<3.3	
0.1 x 1000/100 = 10 mg/L ✓	51.0 x 10 = 510 mg/L ✓
09B 2ccml's	1ccml's
17.7432	50.3718
(59) 17.7427	50.3165
0.0005 <3.3	0.0550 ✓
0.5 x 1000/200 = 2.5 mg/L ✓	55.0 x 10 = 550 mg/L
10B 3ccml's	1ccml's
17.6249	44.5740
(68) 17.6244 <3.3	44.5195
0.0005 ✓	0.0545 ✓
0.5 x 1000/300 = 1.67 mg/L	54.5 x 10 = 545 mg/L

Weekumed Nor

9012 106 | 12/13/80

TSS	TDS @ 180
10 B 300 ml's	100 ml's
18.5970	52.5575
(4) 18.5967	52.5320
0.0003 ✓3.3	0.0555
0.3 × 1000/300 = 1.0 mg/L ✓	55.5 × 10 = 555 mg/L ✓
12 B 300 ml's	100 ml's
18.4711	50.7000
(20) 18.4710	50.6445
0.0001 ✓3.3	0.0555
0.1 × 1000/300 = 0.33 mg/L ✓	55.5 × 10 = ~~55~~ 555 mg/L ✓
13 B 300 ml's	100
17.6843	53.8625
(23) 17.6840	53.8105
0.0003 ✓3.3	0.0520 ✓
0.3 × 1000/300 = 1.0 mg/L ✓	52.0 × 100 = 52 mg/L
14 B 300 ml's	100 ml's
17.2048	50.7660
(24) 17.2045	50.7105
0.0003 ✓3.3	0.0555 ✓
0.3 × 1000/300 = 1.0 mg/L	55.5 × 10 = ~~550~~ 555 mg/L
15 B 200 ml's	100 ml's
19.3598	54.5725
(28) 19.3578	54.5200
0.0020 ✓	0.0525 ✓
2.0 × 1000/200 = 10.0 mg/L	52.5 × 10 = 525 mg/L

0001 GL

Weedwood North

9012106	12/13/90
TSS	TDS @ 180
16B 300 ml's	100 ml's
20.1842	51.5340
(35) 20.1835	51.4805
0.0007	0.0535
7.3	
$0.7 \times \frac{1000}{300} = 2.33$ mg/L ✓	53.5 x 10 = 535 mg/L ✓
12B 200 ml's	100 ml's
19.0889	59.9170
(37) 19.0878	59.8610
0.0011	0.0560
$1.1 \times \frac{1000}{200} = 5.5$ mg/L ✓	560 x 10 = 560 mg/L ✓
18B 300 ml's	100 ml's
19.8154	46.0645
(39) 19.8145	46.0100
0.0009	0.0545
3.3	
$0.9 \times \frac{1000}{300} = 3.0$ mg/L ✓	54.5 x 10 = 545 mg/L ✓
19B 300 ml's	100 ml's
17.3951	49.5500
(63) 17.3940	49.4940
0.0011	0.0560
$1.1 \times \frac{1000}{300} = 3.67$ mg/L ✓	560 x 10 = 560 mg/L
20B 300 ml's	100 ml's
16.2221	45.2090
(64) 16.2210	45.1535
0.0011	0.0555
$1.1 \times \frac{1000}{300} = 3.67$ mg/L ✓	55.5 x 10 = 555 mg/L ✓

MR 12/17

Quality Control Sample

WP 1187 Conc 1 12/2/90

Prepared by D.N

TSS 50 ml's

	16.2350
weight Beach (g)	16.2210
	0.0140

$14.0 \times \frac{1000}{500} = 28.0$ mg/L ✓

TDS @ 180°C 100 ml's

	49.7215
weight Evap dish	49.6780
	0.0435

✓

$43.5 \times \frac{1000}{100} = 435$ mg/L

12/10/90

QUESTIONS? CALL 800-238-5355 TOLL FREE.

PACKAGE TRACKING NUMBER 9727723176

9727723176

RECIPIENT'S COPY

Date 12/10/90

1 From (Your Name) Please Print: [illegible] Chen
Your Phone Number (very important): (303) 279-1421
Department/Floor No.
Company: Woodward-Clyde Federal Services
Street Address: 1801 Tyler St
City: Golden State: CO ZIP Required: 80401

2 To (Recipient's Name) Please Print: Jack Boyce
Recipient's Phone Number (very important): (617) 890-
Department/
Company: Tilli-Skinner/Sherman
Exact Street Address (We cannot deliver to P.O. Boxes or P.O. Zip + Codes): 300 Second Ave
City: Waltham State: Mass ZIP Required: 02451

YOUR INTERNAL BILLING REFERENCE INFORMATION (First 24 characters will appear on invoice.): 1107-500

H IF HOLD FOR PICK-UP Print FEDEX Address Here
Street Address
City State ZIP Required

3 PAYMENT 1 [X] Bill Sender 2 [ ] Bill Recipient's FedEx Acct. No. 3 [ ] Bill 3rd Party FedEx Acct. No. 4 [ ] Bill Credit Card
5 [ ] Cash/Check

4 SERVICES (Check only one box)

Priority Overnight Service (Delivery by next business morning)
11 [X] YOUR PACKAGING
16 [ ] FEDEX LETTER*
12 [ ] FEDEX PAK*
13 [ ] FEDEX BOX
14 [ ] FEDEX TUBE

Standard Overnight Service (Delivery by next business afternoon)
51 [ ]
56 [ ] FEDEX LETTER*
52 [ ] FEDEX PAK*
53 [ ] FEDEX BOX
54 [ ] FEDEX TUBE

Economy Two-Day Service (Delivery Saturday Air)
Heavyweight Services (For packages over 150 lbs.)
70 [ ] HEAVYWEIGHT

DELIVERY AND SPECIAL HANDLING (Check services required)
1 [ ] HOLD FOR PICK-UP
[X] DELIVER WEEKDAY
2 DELIVER SATURDAY
4 [ ] DANGEROUS GOODS
5 [ ]
6 [ ] DRY ICE
7 [ ] OTHER SPECIAL SERVICE
8 [ ]
9 [ ] SATURDAY PICK-UP
10 [ ]
11 [ ]
12 [ ] HOLIDAY DELIVERY

Packages	Weight	Total Declared Value
1	52	6000
Total	Total	Total

BILL SHIPMENT (Calculate weight)
Request Seal
Date Sent

Emp. No. Date
[ ] Cash Received
[ ] Return Shipment
[ ] Third Party [ ] Chg. To Dist. [ ] Chg. To Home
Street Address
City State Zip
Recipient's Signature: X Theta Berry
Date/Time Received 12/11/90 Fedex Employee Number 930

Relinquished Signature
Date/Time

Federal Express Base Charges
Declared Value
Other 1
Other 2
Total Charges

REVISION DATE 8/90 PART 0119500 GBI FORMAT 4984
049

AIRBILL PACKAGE TRACKING NUMBER 9727723143

QUESTIONS? CALL 800-238-5355 TOLL FREE.

9727723143

RECIPIENT'S COPY

Date 12/10/90

1 From (Your Name) Please Print: [illegible] Chen
Your Phone Number (very important): (303) 279-1421
Department/Floor No.
Company: Woodward-Clyde Federal Services
Street Address: 1801 Tyler St
City: Golden State: CO ZIP Required: 80401

2 To (Recipient's Name) Please Print: Jack Boyce
Recipient's Phone Number (very important): (617) 890-
Department/F
Company: Tilli-Skinner/Sherman
Exact Street Address (We cannot deliver to P.O. Boxes or P.O. Zip + Codes): 300 Second Ave
City: Waltham State: Mass ZIP Required: 02451

YOUR INTERNAL BILLING REFERENCE INFORMATION (First 24 characters will appear on invoice.): 1107-500

H IF HOLD FOR PICK-UP Print FEDEX Address Here
Street Address
City State ZIP Required

3 PAYMENT 1 [X] Bill Sender 2 [ ] Bill Recipient's FedEx Acct. No. 3 [ ] Bill 3rd Party FedEx Acct. No. 4 [ ] Bill Credit Card
5 [ ] Cash/Check

4 SERVICES (Check only one box)

Priority Overnight Service (Delivery by next business morning)
11 [X] YOUR PACKAGING
16 [ ] FEDEX LETTER*
2 [ ] FEDEX PAK
13 [ ] FEDEX BOX
14 [ ] FEDEX TUBE

Standard Overnight Service (Delivery by next business afternoon)
51 [ ]
56 [ ] FEDEX LETTER*
52 [ ] FEDEX PAK*
53 [ ] FEDEX BOX
54 [ ] FEDEX TUBE

Economy Two-Day Service
30 [ ] 2-Day

DELIVERY AND SPECIAL HANDLING (Check services required)
1 [ ] HOLD FOR PICK-UP
[X] DELIVER WEEKDAY
2 DELIVER SATURDAY
4 [ ] DANGEROUS GOODS
5 [ ]
6 [ ] DRY ICE
7 [ ] OTHER SPECIAL SERVICE
8 [ ]
9 [ ] SATURDAY PICK-UP

Packages	Weight	Total Declared Value
1	2	2000
Total	Total	Total

Emp. No. Date
[ ] Cash Received
[ ] Return Shipment
[ ] Third Party [ ] Chg. To Dist. [ ] Chg. To Home
Street Address
City State Zip
Recipient's Signature: X Theta Berry
Date/Time Received 12/12/90 Fedex Employee Number 930

Relinquished Signature
Date/Time

Federal Express Base Charges
Declared Value
Other 1
Other 2
Total Charges

REVISION DATE 8/90 PART 0119500 GBI FORMAT 4984
041

000[illegible]

→ See Sample # 03CWC1005, COC # 015 AT TMA/NORCAL For Rad Assay ←

Woodward-Clyde Consultants
Stanford Place 3 Suite 1000 4582 South Ulster Street Parkway
Denver Colorado 80237 (303) 694-2770

Chain of Custody Record
COC # 021

PROJECT NO. 22558 Task 500

SAMPLERS: (Signature) T. W. Lynch, T. Zuber

DATE	TIME	SAMPLE NUMBER	Metals	Wet Chem*	NO_3/NO_2					NUMBER OF CONTAINERS
12/7/90	1000	04CWC1006	X	X	X					3
	1230	30CPF1001	X	X	X					3
	1400	30CPF1002	X	X	X					3
	1500	30CPF1003	X	X	X					3
	1400	30CPF1004	X	X	X					3
	1500	30CPF1005	X	X	X					3
	1400	30CPF1006	X	X	X					3
	1500	30CPF1007	X	X	X					3
12/10/90	0945	32CPF1008	X	X	X					3
	1045	32CPF1009	X	X	X					3
	0945	32CPF2010	X	X	X					3
	1045	32CPF2011	X	X	X					3
	0945	32CPF1012	X	X	X					3
	1045	32CPF1013	X	X	X					3

BE Clow 12/10/90

TOTAL NUMBER OF CONTAINERS 42

REMARKS (Sample preservation handling procedures, etc.)
For TMA Skinner/Sherman

Matrix – Water

All samples stored on ice.

*Wet Chem: Cl⁻, F⁻, Carb./Bicarb., pH, Sulfate, TDS, TSS, Cond.

– Metals preserved w/ HNO_3 to pH<2
– NO_3/NO_2 Preserved w/ H_2SO_4 to pH<2

Contact personnel:
Brian Clow
(303) 279-4501 x205

RELINQUISHED BY (Signature)	DATE/TIME	RECEIVED BY (Signature)	RELINQUISHED BY (Signature)	DATE/TIME	RECEIVED BY (Signature)
BE Clow	12/7/90 7:30				

METHOD OF SHIPMENT	SHIPPED BY (Signature)	COURIER (Signature)	RECEIVED FOR LAB BY (Signature)	DATE/TIME
			A. L. B.	12/11 9:30

→ See Sample # 0HCWC1006, COC # 020 ie TMA-NORCAL For Rad Assay

Woodward-Clyde Consultants
Stanford Place 3 Suite 1000 4582 South Ulster Street Parkway
Denver Colorado 80237 (303) 694-2770

Chain of Custody Record
COC # 022

PROJECT NO. 22558 Task 500

SAMPLERS: (Signature) R.W. [illegible] R.G. [illegible]

DATE	TIME	SAMPLE NUMBER	Metals	Wet Chem*	NO_3/NO_2					NUMBER OF CONTAINERS
12/10/90	1215	32CPF1014	X	X	X					3
	1315	32CPF1015	X	X	X					3
	1215	32CPF1016	X	X	X					3
	1315	32CPF1017	X	X	X					3
	1100	32CPF1018	X	X	X					3
	1215	32CPF1019	X	X	X					3
	1315	32CPF1020	X	X	X					3
	1500	32CPF1021	X	X	X					3
	1530	32CPF1022	X	X	X					3
	1500	32CPF1023	X	X	X					3
	1530	32CPF1024	X	X	X					3
	1500	34CPF1025	X	X	X					3
	1530	34CPF1026	X	X	X					3

BZ Clow 12/10/90

TOTAL NUMBER OF CONTAINERS 39

REMARKS (Sample preservation handling procedures, etc.)
For TMA-Skinner/Shem

Matrix - Water

All samples stored on ice.

*Wet Chem:
Cl^-, F^-, Carb/Bicarb, pH, Sulfate, TDS, TSS, Cond.

- Metals Preserved w/ HNO_3 to pH<2
- NO_3/NO_2 Preserved w/ H_2SO_4 to pH<2

Contact personnel:
Brian Clow
(303) 279-4501 x205

RELINQUISHED BY (Signature)	DATE/TIME	RECEIVED BY (Signature)	RELINQUISHED BY (Signature)	DATE/TIME	RECEIVED BY (Signature)
BZ Clow	12/10/1730				

METHOD OF SHIPMENT	SHIPPED BY (Signature)	COURIER (Signature)	RECEIVED FOR LAB BY (Signature)	DATE/TIME
			[illegible]	12/11 9:30

000040

TMA
Thermo Analytical Inc.

TMA/Norcal
2030 Wright Avenue
P.O. Box 4040
Richmond, CA 94804-0040

(415) 235-2633 Fax No. (415) 235-0438

December 12, 1990

Antonia Benney
TMA/Skinner & Sherman
300 Second Ave.
P.O. Box 521
Waltham MA 02254-0521

Dear Antonia

The samples you received 12/11/90 from Woodward Clyde on COC's 21, 22 and 23 are part of the same set of samples covered on the earlier Mixed Waste Work Plan for this project and can be handled similarly.

Sincerely

David Rodgers

David Rodgers

Radiation Safety Officer

cc: D Stuermer (Norcal)

TMA
Thermo Analytical Inc.

Skinner & Sherman Laboratories Inc.
300 Second Avenue
Post Office Box 521
Waltham MA 02254 0521

(617) 890-7200

Federal Express #9295313296
February 12, 1991

TMA/NORCAL
2030 Wright Avenue
Richmond ,CA 94804
Attention: Dan Steurmer

Dear To Whom It May Concern:

Enclosed are the results for the wet chemical analysis of nineteen water samples recieved on December 11, 1991. The samples were analyzed under Skinner and Sherman work order number 9012109.

Duplicate, matrix spike, blank, and laboratory control sample results are included in the quality control section of the report. The laboratory control samples are EPA QC samples where available or alternate source standards. The true values and recoveries are reported in the QC section of the report. All holding times were met for the various analysis. All raw data is included in the report. All analysis were performed in strict accordance with the methods specified in the report.

Please feel free to call if there are any questions concerning the enclosed.

Sincerely,

SKINNER & SHERMAN LABORATORIES

David N. Peterson
Assistant Laboratory Manager

Scientific Services Since 1922

ENVIRONMENTAL

CHEMICAL ■ PHYSICAL

ELECTRICAL ■ METALLURGICAL

prepared for

TMA/NORCAL

WORK ORDER #9012109

TMA
Thermo Analytical Inc.

Skinner & Sherman Laboratories Inc.

300 Second Avenue, P O Box 521, Waltham, Massachusetts 02254-0521 (617) 890-7200
1-800-41 AB TEST FAX (617) 890-3883

Received: 12/12/90 02/12/91 14:12:53

REPORT TMA/NORCAL
TO 2030 Wright Avenue
Richmond, CA 94804

ATTEN Dan Steurmer

CLIENT WOODWARD NOR SAMPLES 19
COMPANY TMA/NORCAL
FACILITY Richmond, CA

PREPARED TMA / Skinner & Sherman Labs.
BY 300 Second Avenue
P.O. Box 521
Waltham, MA 02254

ATTEN Client Services
PHONE (617) 890-7200

CERTIFIED BY

CONTACT DP

WORK ID Woodward Clyde COC #022,023
TAKEN By Client
TRANS Fedex
TYPE Wet Chemistry
P O. # N1-01-023/TMA 8084
INVOICE under separate cover

SAMPLE IDENTIFICATION	
01	32CPF1020
02	32CPF1021
03	32CPF1022
04	32CPF1023
05	32CPF1024
06	34CPF1025
07	34CPF1026
08	34CPF1027
09	34CPF1028
10	34CPF1029
11	34CPF1030
12	34CPF1031
13	34CPF1032
14	34CPF1033
15	34CPF1034
16	34CPF1035
17	34CPF1036
18	34CPF1037
19	34CPF1038

TEST CODES and NAMES used on this workorder

CL W	Chloride - Aqueous
CO3 W	CARBONATE
F W	Fluoride - Aqueous
NO3NO2	Nitrate Plus Nitrite
PH W	pH - Aqueous
SO4 W	Sulfate - Aqueous
S COND	Specific Conductance
TDS	Total Dissolved Solids
TSS	Total Suspended Solids

This report is rendered upon all of the following conditions. Skinner & Sherman Laboratories, Inc retains ownership of this report until associated submitted invoice is satisfied. Expert witness services shall be available in conjunction with this report only if prior notification of this potential requirement was made and accepted before the analysis. Client will be responsible for Skinner & Sherman costs and consulting fees if our services are required by subpoena or otherwise in legal proceedings. Total liability is limited to the invoice amount. The results listed refer only to tested samples and applicable parameters. Product endorsement is neither inferred nor implied. Skinner & Sherman Laboratories, Inc. will exercise due diligence but will not be responsible for lost or destroyed samples or evidence unless client makes appropriate insurance coverage arrangements. Samples are held for thirty days following issuance of report. Samples will be stored at client s expense if authorized in writing.

TMA
Thermo Analytical Inc.
Skinner & Sherman Laboratories Inc. 300 Second Avenue, P O Box 521, Waltham, Massachusetts 02254-0521 (617) 890-7200
1-800-4LAB TEST FAX (617) 890-3883

Received: 12/12/90 Results by Sample

SAMPLE ID 32CPF1020 SAMPLE # 01 FRACTIONS: A,B
Date & Time Collected not specified Category

CL_W	CO3_W	F_W	NO3NO2	PH_W	SO4_W
62.5 mg/L	422 mg CaCO3/L	<1.0 mg/L	3.71 mg N/L	8.17 pH units	46.2 mg/L

S_COND	TDS	TSS
954 micromhos	610 mg/L	<3.3 mg/L

SAMPLE ID 32CPF1021 SAMPLE # 02 FRACTIONS. A,B
Date & Time Collected not specified Category

CL_W	CO3_W	F_W	NO3NO2	PH_W	SO4_W
61.5 mg/L	428 mg CaCO3/L	1.0 mg/L	3.67 mg N/L	7.91 pH units	42 4 mg/L

S_COND	TDS	TSS
1010 micromhos	580 mg/L	5.5 mg/L

SAMPLE ID 32CPF1022 SAMPLE # 03 FRACTIONS. A,B
Date & Time Collected not specified Category

CL_W	CO3_W	F_W	NO3NO2	PH_W	SO4_W
<5.0 mg/L	424 mg CaCO3/L	<1.0 mg/L	3.29 mg N/L	7.98 pH units	40 8 mg/L

S_COND	TDS	TSS
954 micromhos	600 mg/L	3.3 mg/L

SAMPLE ID 32CPF1023 SAMPLE # 04 FRACTIONS A,B
Date & Time Collected not specified Category

CL_W	CO3_W	F_W	NO3NO2	PH_W	SO4_W
61.7 mg/L	438 mg CaCO3/L	1.0 mg/L	3.71 mg N/L	8.02 pH units	43.4 mg/L

S_COND	TDS	TSS
949 micromhos	625 mg/L	11.0 mg/L

SAMPLE ID 32CPF1024 SAMPLE # 05 FRACTIONS. A,B
Date & Time Collected not specified Category

CL_W	CO3_W	F_W	NO3NO2	PH_W	SO4_W
61.6 mg/L	416 mg CaCO3/L	<1.0 mg/L	3.73 mg N/L	7.89 pH units	43 8 mg/L

S_COND	TDS	TSS
926 micromhos	635 mg/L	4.3 mg/L

TMA
Thermo Analytical Inc.

This report is rendered upon all of the following conditions. Skinner & Sherman Laboratories, Inc. retains ownership of this report until associated submitted invoice is satisfied. Expert witness services shall be available in conjunction with this report only if prior notification of this potential requirement was made and accepted, before the analysis. Client will be responsible for Skinner & Sherman costs and consulting fees if our services are required by subpoena or otherwise in legal proceedings. Total liability is limited to the invoice amount. The results listed refer only to tested samples and applicable parameters. Product endorsement is neither inferred nor implied Skinner & Sherman Laboratories Inc. will exercise due diligence but will not be responsible for lost or destroyed samples or evidence unless client makes appropriate insurance coverage arrangements. Samples are held for thirty days following issuance of report. Samples will be stored at client s expense, if authorized in writing.

Skinner & Sherman Laboratories Inc. 300 Second Avenue, P O Box 521, Waltham, Massachusetts 02254-0521 (617) 890-7200

Received: 12/12/90 Results by Sample

SAMPLE ID 34CPF1025 SAMPLE # 06 FRACTIONS. A,B
Date & Time Collected not specified Category

CL_W	CO3_W	F_W	NO3NO2	PH_W	SO4_W
59.4 mg/L	380 mg CaCO3/L	1.0 mg/L	3.58 mg N/L	7 62 pH units	52 4 mg/L

S_COND	TDS	TSS
960 micromhos	575 mg/L	5.0 mg/L

SAMPLE ID 34CPF1026 SAMPLE # 07 FRACTIONS. A,B
Date & Time Collected not specified Category

CL_W	CO3_W	F_W	NO3NO2	PH_W	SO4_W
59.6 mg/L	386 mg CaCO3/L	<1.0 mg/L	3.65 mg N/L	7.90 pH units	55 6 mg/L

S_COND	TDS	TSS
960 micromhos	580 mg/L	<3.3 mg/L

SAMPLE ID 34CPF1027 SAMPLE # 08 FRACTIONS. A,B
Date & Time Collected not specified Category

CL_W	CO3_W	F_W	NO3NO2	PH_W	SO4_W
59.6 mg/L	380 mg CaCO3/L	<1.0 mg/L	3.63 mg N/L	7.51 pH units	45 2 mg/L

S_COND	TDS	TSS
960 micromhos	590 mg/L	7 5 mg/L

SAMPLE ID 34CPF1028 SAMPLE # 09 FRACTIONS A,B
Date & Time Collected not specified Category

CL_W	CO3_W	F_W	NO3NO2	PH_W	SO4_W
62.4 mg/L	382 mg CaCO3/L	<1.0 mg/L	3.65 mg N/L	7 82 pH units	50 6 mg/L

S_COND	TDS	TSS
960 micromhos	620 mg/L	<3.3 mg/L

SAMPLE ID 34CPF1029 SAMPLE # 10 FRACTIONS A,B
Date & Time Collected not specified Category

CL_W	CO3_W	F_W	NO3NO2	PH_W	SO4_W
59.7 mg/L	378 mg CaCO3/L	<1.0 mg/L	3.67 mg N/L	7.34 pH units	44 4 mg/L

S_COND	TDS	TSS
960 micromhos	580 mg/L	6.7 mg/L

TMA
Thermo Analytical Inc.

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Skinner & Sherman Laboratories Inc. 300 Second Avenue, P O Box 521, Waltham, Massachusetts 02254-0521 (617) 890-7200
1 800 4 LAB TEST FAX (617) 890 2882

Received: 12/12/90 Results by Sample

SAMPLE ID 34CPF1030 SAMPLE # 11 FRACTIONS. A,B
Date & Time Collected not specified Category

CL_W	CO3_W	F_W	NO3NO2	PH_W	SO4_W
59.5 mg/L	388 mg CaCO3/L	1.0 mg/L	3.66 mg N/L	8.00 pH units	42.8 mg/L

S_COND	TDS	TSS
937 micromhos	600 mg/L	<3.3 mg/L

SAMPLE ID 34CPF1031 SAMPLE # 12 FRACTIONS. A,B
Date & Time Collected not specified Category

CL_W	CO3_W	F_W	NO3NO2	PH_W	SO4_W
59.8 mg/L	382 mg CaCO3/L	1.0 mg/L	3.66 mg N/L	7.62 pH units	51 2 mg/L

S_COND	TDS	TSS
954 micromhos	610 mg/L	6.5 mg/L

SAMPLE ID 34CPF1032 SAMPLE # 13 FRACTIONS. A,B
Date & Time Collected not specified Category

CL_W	CO3_W	F_W	NO3NO2	PH_W	SO4_W
59.9 mg/L	390 mg CaCO3/L	1.0 mg/L	3.69 mg N/L	7.91 pH units	49 3 mg/L

S_COND	TDS	TSS
949 micromhos	605 mg/L	3.3 mg/L

SAMPLE ID 34CPF1033 SAMPLE # 14 FRACTIONS A,B
Date & Time Collected not specified Category

CL_W	CO3_W	F_W	NO3NO2	PH_W	SO4_W
60.0 mg/L	420 mg CaCO3/L	<1.0 mg/L	3.73 mg N/L	8.09 pH units	53 0 mg/L

S_COND	TDS	TSS
1020 micromhos	640 mg/L	8.5 mg/L

SAMPLE ID 34CPF1034 SAMPLE # 15 FRACTIONS. A,B
Date & Time Collected not specified Category

CL_W	CO3_W	F_W	NO3NO2	PH_W	SO4_W
60.2 mg/L	412 mg CaCO3/L	<1.0 mg/L	3.67 mg N/L	7.96 pH units	51 6 mg/L

S_COND	TDS	TSS
960 micromhos	660 mg/L	8.0 mg/L

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Skinner & Sherman Laboratories Inc. 300 Second Avenue, P O Box 521, Waltham, Massachusetts 02254-0521 (617) 890-7200
1-800-4 LAB TEST FAX (617) 890-3883

Received: 12/12/90 Results by Sample

SAMPLE ID 34CPF1035 SAMPLE # 16 FRACTIONS. A,B
Date & Time Collected not specified Category

CL_W	CO3_W	F_W	NO3NO2	PH_W	SO4_W
60.3 mg/L	428 mg CaCO3/L	1.0 mg/L	3.60 mg N/L	8.07 pH units	42.4 mg/L

S_COND	TDS	TSS
982 micromhos	635 mg/L	7.5 mg/L

SAMPLE ID 34CPF1036 SAMPLE # 17 FRACTIONS: A,B
Date & Time Collected not specified Category

CL_W	CO3_W	F_W	NO3NO2	PH_W	SO4_W
60.2 mg/L	398 mg CaCO3/L	<1.0 mg/L	3.67 mg N/L	7 81 pH units	43 8 mg/L

S_COND	TDS	TSS
925 micromhos	630 mg/L	4.0 mg/L

SAMPLE ID 34CPF1037 SAMPLE # 18 FRACTIONS A,B
Date & Time Collected not specified Category

CL_W	CO3_W	F_W	NO3NO2	PH_W	SO4_W
60.1 mg/L	438 mg CaCO3/L	<1.0 mg/L	3.64 mg N/L	8.01 pH units	42 0 mg/L

S_COND	TDS	TSS
1020 micromhos	640 mg/L	8.5 mg/L

SAMPLE ID 34CPF1038 SAMPLE # 19 FRACTIONS: A,B
Date & Time Collected not specified Category

CL_W	CO3_W	F_W	NO3NO2	PH_W	SO4_W
59.8 mg/L	420 mg CaCO3/L	1.0 mg/L	3.68 mg N/L	7.98 pH units	46.0 mg/L

S_COND	TDS	TSS
937 micromhos	640 mg/L	5.0 mg/L

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TMA/NORCAL

QUALITY CONTROL

NITRATE/NITRITE

MATRIX SPIKE

Sample ID	Sample Result	Spike Added	Spike Result	% Recovery
9012109-01	(1·1) 3 71 mg/L	1 55 mg/L	3.47 mg/L	104 2

DUPLICATE

Sample ID	Sample Result	Duplicate Result	Relative % Difference
9012109-01	3.71 mg/L	3 69 mg/L	0.5

QUALITY CONTROL SAMPLES

Sample ID	True Value	Found Value	% Recovery
LCS	2 00 mg/L	2 03 mg/L	101 5
Blank		<0 25 mg/L	

CHLORIDE

MATRIX SPIKE

Sample ID	Sample Result	Spike Added	Spike Result	% Recovery
9012109-01	(1 1) 62 5 mg/L	25 0 mg/L	56 7 mg/L	101 8

DUPLICATE

Sample ID	Sample Result	Duplicate Result	Relative % Difference
9012109-01	62 5 mg/L	62.1 mg/L	0 6

QUALITY CONTROL SAMPLES

Sample ID	True Value	Found Value	% Recovery
LCS	52.1 mg/L	51 8 mg/L	99 4
Blank		<5 0 mg/L	

ALKALINITY

DUPLICATE

Sample ID	Sample Result	Duplicate Result	Relative % Difference
9012109-01	422 mg/L	420 mg/L	0.5

QUALITY CONTROL SAMPLES

Sample ID	True Value	Found Value	% Recovery
LCS	27 0 mg/L	24 9 mg/L	92.2

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1-800-4 LAB TEST FAX (617) 890-2882

TMA/NORCAL

FLUORIDE

MATRIX SPIKE

Sample ID	Sample Result	Spike Added	Spike Result	% Recovery
9012109-01	(1.1) <1.0 mg/L	2.5 mg/L	2.7 mg/L	108.0

DUPLICATE

Sample ID	Sample Result	Duplicate Result	Relative % Difference
9012109-01	<1 0 mg/L	<1 0 mg/L	not calculable

QUALITY CONTROL SAMPLES

Sample ID	True Value	Found Value	% Recovery
LCS	1 0 mg/L	1.0 mg/L	100 0
Blank		<1.0 mg/L	

SULFATE

MATRIX SPIKE

Sample ID	Sample Result	Spike Added	Spike Result	% Recovery
9012109-08	45.2 mg/L	10 0 mg/L	53 8 mg/L	86 0

DUPLICATE

Sample ID	Sample Result	Duplicate Result	Relative % Diffepence
9012109-08	45.2 mg/L	45 2 mg/L	0

QUALITY CONTROL SAMPLES

Sample ID	True Value	Found Value	% Recovery
LCS	20 0 mg/L	18.5 mg/L	92 5
Blank		<5 0 mg/L	

SPECIFIC CONDUCTANCE

DUPLICATE

Sample ID	Sample Result	Duplicate Result	Relative % Difference
9012109-01	954 micromhos	954 micromhos	0

QUALITY CONTROL SAMPLES

Sample ID	True Value	Found Value	% Recovery
LCS	267 micromhos	286 micromhos	107 1
Blank		1 0 micromhos	

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TMA/NORCAL

TOTAL DISSOLVED SOLIDS

QUALITY CONTROL SAMPLES

Sample ID	True Value	Found Value	% Recovery
LCS	32.1 mg/L	28 0 mg/L	87 2

TOTAL SUSPENDED SOLIDS

QUALITY CONTROL SAMPLES

Sample ID	True Value	Found Value	% Recovery
LCS	414 mg/L	435 mg/L	105.1

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1 800 4 LAB TEST FAX (617) 890 2882

TEST CODE CL W NAME Chloride - Aqueous

Standard Methods for Chemical Analysis of Water and Wastes
EPA - 600/4-79-020, March 1979, Method 325.2.

TEST CODE CO3 W NAME CARBONATE

Standard Methods for the Examination of Water and Wastewater (16th Edition, 1985), Method 403.

TEST CODE F W NAME Fluoride - Aqueous

Method for Chemical Analysis of Water and Wastes EPA-600/4-79-020, March 1983 Method 340 2.

TEST CODE NO3NO2 NAME Nitrate Plus Nitrite

Methods for Chemical Analysis of Water and Wastes
EPA - 600/4-79-020 March 1979 Method 353 1

TEST CODE PH W NAME pH - Aqueous

Standard Methods for the Examination of Water and Wastewater, (16th Edition, 1985), Method 423

TEST CODE SO4 W NAME Sulfate - Aqueous

Standard Methods for the Examination of Water and Wastewater (16th Edition) Method 426C.

TEST CODE S COND NAME Specific Conductance

Standard Methods for the Examination of Water and Wastewater, (16th Edition, 1985), Method 205

TEST CODE TDS NAME Total Dissolved Solids

Standard Methods for the Examination of Water and Wastewater, (16th Edition, 1985) Method 209B

TEST CODE TSS NAME Total Suspended Solids

Standard Methods for the Examination of Water and Wastewater (16th Edition, 1985), Method 209C

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1-800-4 LAB TEST FAX (617) 890-3893

SKINNER & SHERMAN LABORATORIES

TRAACS 800 SYSTEM BENCH SHEET
GENERAL ANALYSIS

DATE: 1/7/91
ANALYST: LEEDHAM
METHOD:

Nitrate/Nitrite 353.2

RUN ID'S: ~~SA~~ 91007 - 05

WORKORDER: 9012106, 9012109

STANDARDS:	NAME	SOURCE	PREPARED
ICV	NP587		
CCV	1.24 PPM		
ICB/CCB			

relabs 0.8900

POS	LAB ID	SAMPLE ID	COMMENTS
01	Prime		
02	0.62		
03	1.24		
04	2.48		
05	3.1		
06	3.1		
07	0.62		
08	0.62		
09	ICV/LCS		
10	ICB		
11	DI		
12	9012106-01	2x Dilution	
13	010		
14	015		
15	02		
16	03		
17	04		
18	05		
19	06		
20	07		
21	CCV		
22	CCB		
23	08	2x Dilution	
24	09		
25	10		
26	11		
27	12		
28	13		
29	14		
30	15		
31	16		
32	17		
33	CCV		
34	CCB		
35	18	2x	

Spike 1.55 ppm
1ml sample
Plus 1ml 3.1 ppm
Thus 1.55 ppm

56

000010

SKINNER & SHERMAN LAB
TRAACS BENCH SHEET
DATE: 1/7/91

RUN ID: S6007

POS	LAB ID	SAMPLE ID	COMMENTS
36	19	2x Dilution	
37	20		
38	S6172C9-01		
39	010		
40	015		
41	02		
42	03	SV	
43	04	(2x)	
44	05	(2x)	
45	CCV		
46	CCB		
47	06	2x Dilution	
48	07		
49	08		
50	09		
51	10		
52	11		
53	12		
54	13		
55	14		
56	15		
57	CCV		
58	CCB		
59	16	2x Dilution	
60	17		
61	18		
62	19		
63	CCV		
64	CCB		
65			
66			
67			
68			
69			
70			
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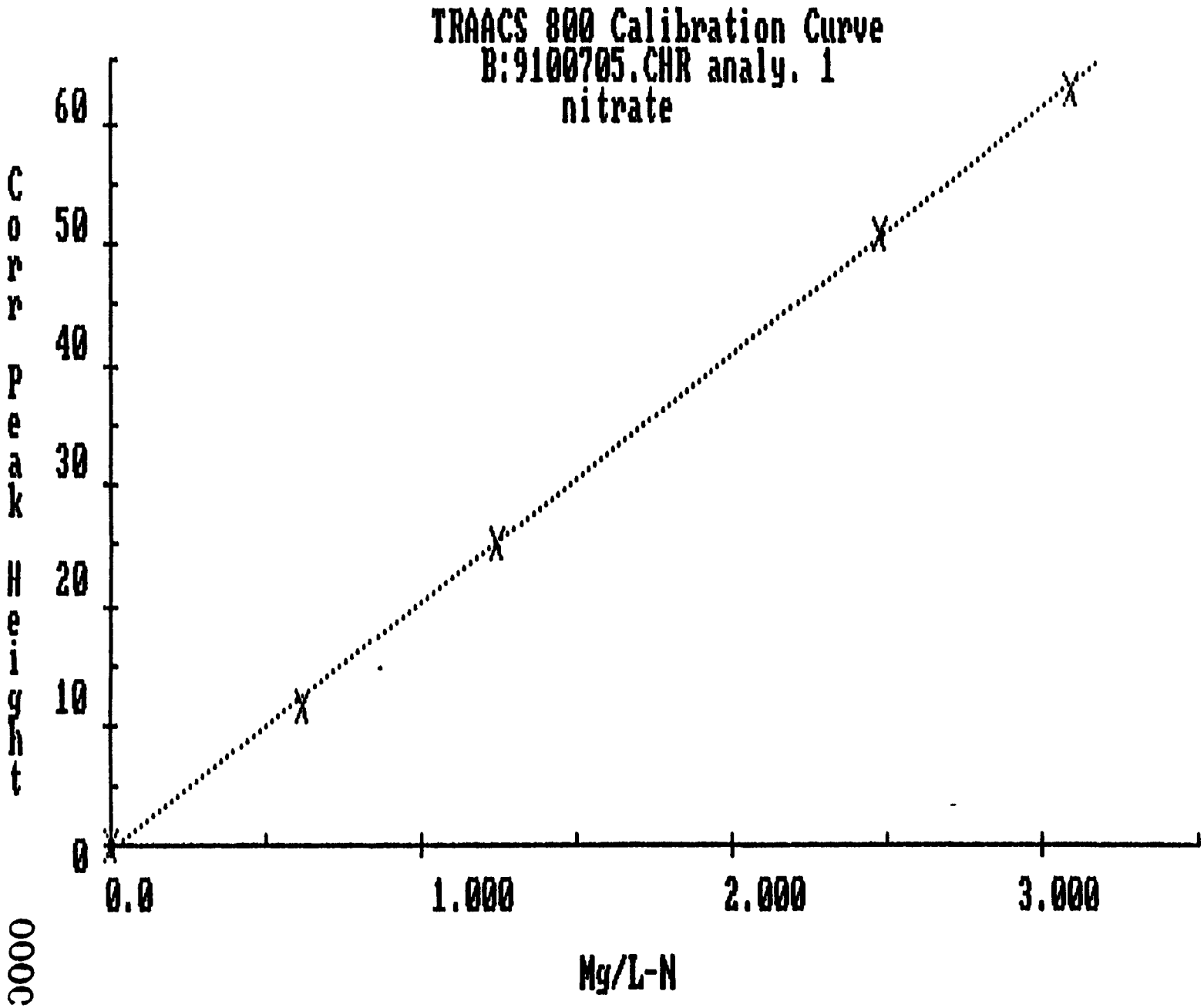
82			
83			
84			
85			


TRAACS 800 Calibration Curve
B:9100705.CHR analy. 1
nitrate
Corr Peak Height
60
50
40
30
20
10
0
0.0
1.000
2.000
3.000
Mg/L-N

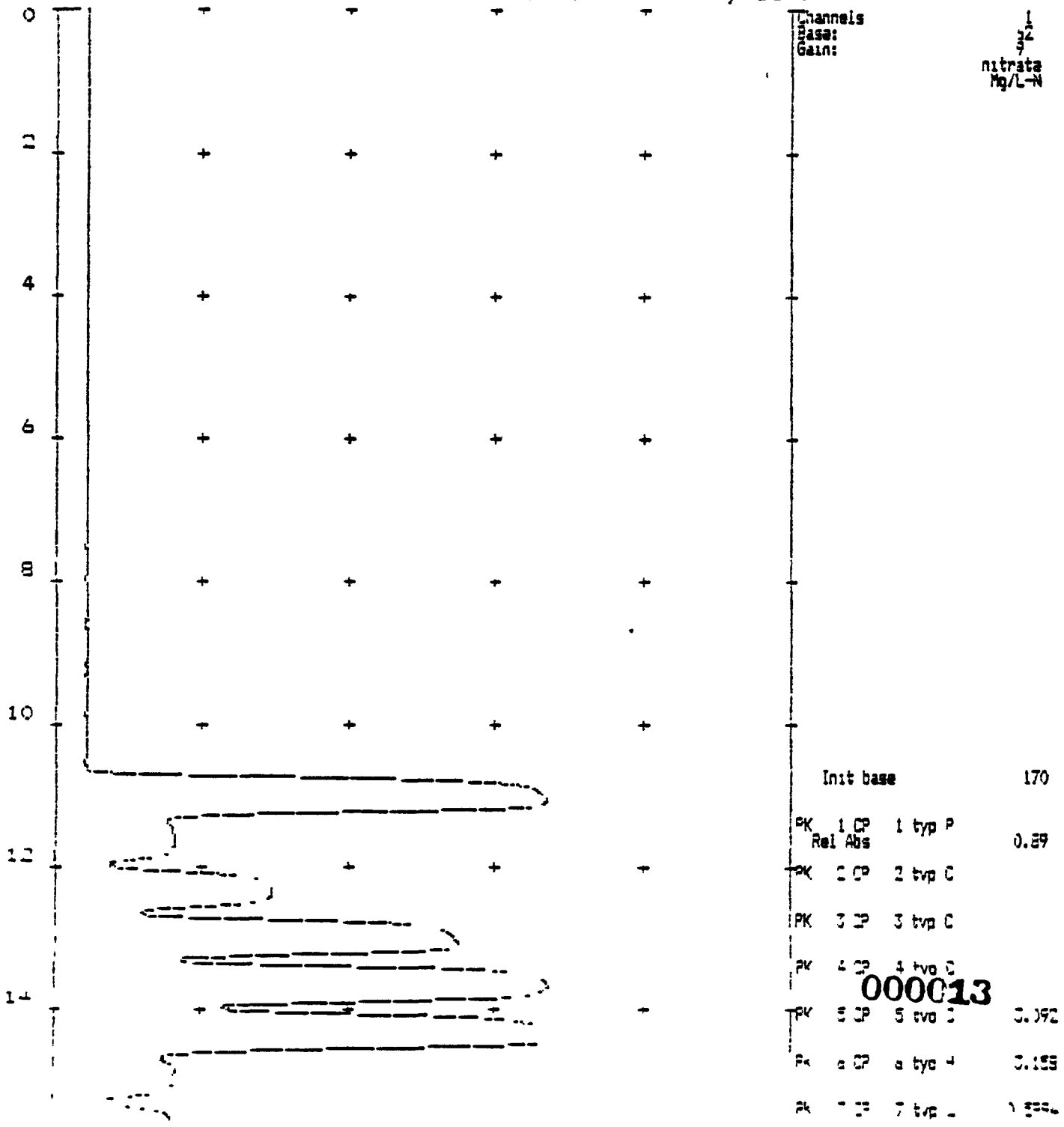
000C12

Chart minimum: 0%, maximum 100%
Active analysis: 1

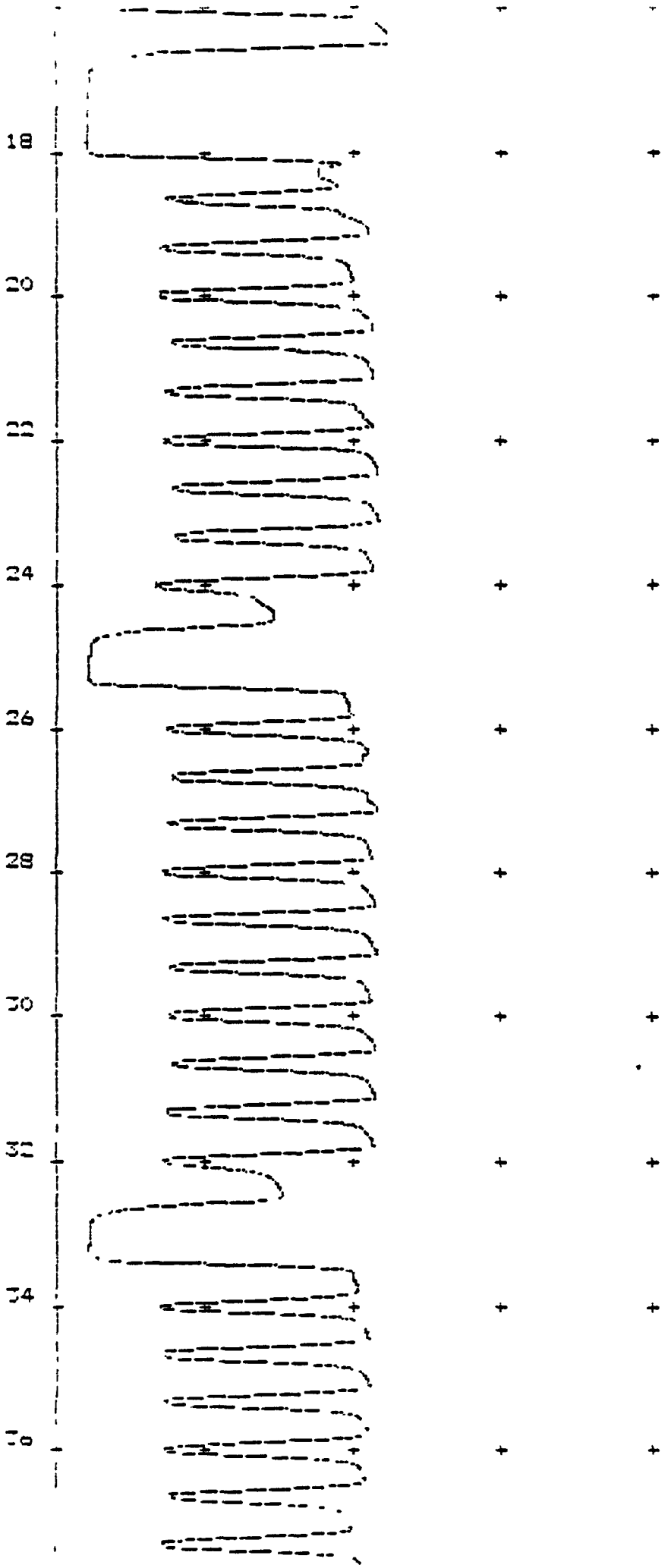
Input Filename: B:NIT.INP
Time: 18:34; Date: 01-07-91
Operator: NEEDHAM

Comment: commercial nitrate with four calibrants

There are 15513600 (bytes) free on disk.
File B:9100705.CHR will take approximately 10640 (bytes).

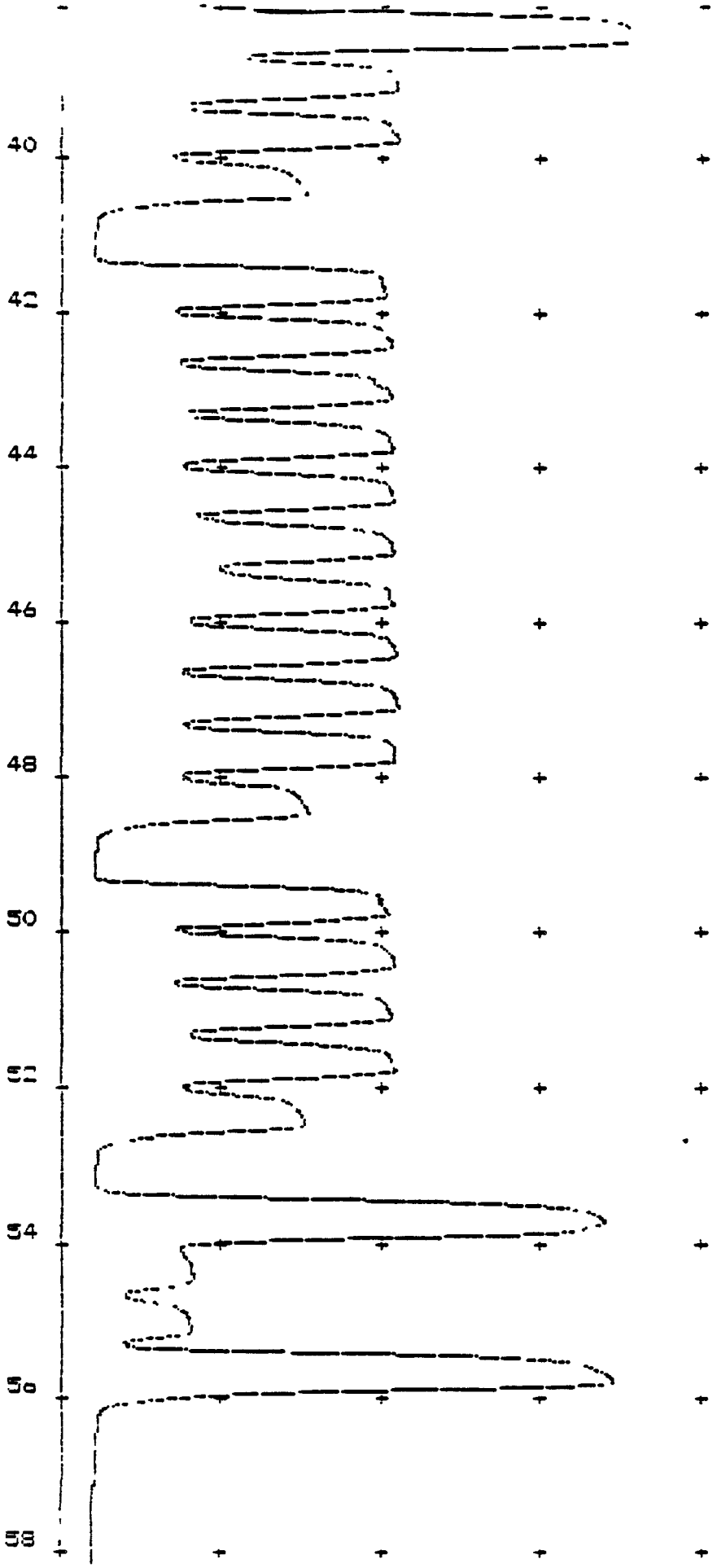


000013



PK	8 CP	8	typ	S	[illegible]
PK	9 CP	9	typ	S	[illegible]
PK	10 CP	10	typ	S	0.02323 M
PK	11 CP	11	typ	S	0.01932 M
PK	12 CP	12	typ	S	1.631 N
PK	13 CP	13	typ	S	1.360 N
PK	14 CP	14	typ	S	1.781
PK	15 CP	15	typ	S	1.891
PK	16 CP	16	typ	S	1.898
PK	17 CP	17	typ	S	1.889 N
PK	18 CP	18	typ	S	1.928
PK	19 CP	19	typ	S	1.929
PK	20 CP	20	typ	S	1.898
PK	21 CP	21	typ	S	1.232 N
PK	22 CP	22	typ	S	0.02646 M
PK	23 CP	23	typ	S	1.763
PK	24 CP	24	typ	S	1.861
PK	25 CP	25	typ	S	1.920 N
PK	26 CP	26	typ	S	1.888
PK	27 CP	27	typ	S	1.911
PK	28 CP	28	typ	S	1.919
PK	29 CP	29	typ	S	1.883
PK	30 CP	30	typ	S	1.908
PK	31 CP	31	typ	S	1.913
PK	32 CP	32	typ	S	1.901
PK	33 CP	33	typ	S	1.299
PK	34 CP	34	typ	S	0.03123 M
PK	35 CP	35	typ	S	1.798
PK	36 CP	36	typ	S	1.869
PK	37 CP	37	typ	S	1.870
PK	[illegible]	[illegible]	[illegible]	[illegible]	1.861
PK	39 CP	39	typ	S	1.855
PK	40 CP	40	typ	S	[illegible]

000014



PK	42	CP	42	typ	S	0.207
PK	43	CP	43	typ	S	1.368
PK	44	CP	44	typ	S	1.873
PK	45	CP	45	typ	S	1.297
PK	46	CP	46	typ	S	0.02766 M
PK	47	CP	47	typ	S	1.793
PK	48	CP	48	typ	S	1.833
PK	49	CP	49	typ	S	1.827 N
PK	50	CP	50	typ	S	1.835
PK	51	CP	51	typ	S	1.845
PK	52	CP	52	typ	S	1.839
PK	53	CP	53	typ	S	1.839
PK	54	CP	54	typ	S	1.857
PK	55	CP	55	typ	S	1.878
PK	56	CP	56	typ	S	1.849
PK	57	CP	57	typ	S	1.316
PK	58	CP	58	typ	S	0.02766 M
PK	59	CP	59	typ	S	1.806
PK	60	CP	60	typ	S	1.848
PK	61	CP	61	typ	S	1.831
PK	62	CP	62	typ	S	1.851
PK	63	CP	63	typ	S	1.293
PK	64	CP	64	typ	S	0.02646 M
PK	65	CP	65	typ	H	3.121
PK	66	CP	66	typ	L	0.6197
PK	67	CP	67	typ	L	0.6077
PK	68	CP	68	typ	G	3.181

000015

Time: 18:34: Date: 01-07-91
Operator: NEEDHAM

NO_3/NO_2

Channels 1
Base: 62
Gain: 9

nitrate
Mg/L-N

Base drift correction made
Carryover correction made
Gain drift correction made

Init base					170		
PK	1	CP	1	typ	P	3.086	Prev
Rel Abs						0.89	
PK	2	CP	2	typ	C	0.5891	0.62 ppm
PK	3	CP	3	typ	C	1.242	1.24
PK	4	CP	4	typ	C	2.498	2.48
PK	5	CP	5	typ	C	3.091	3.1
PK	6	CP	6	typ	H	3.154	3.1
PK	7	CP	7	typ	L	0.5937	0.62
PK	8	CP	8	typ	L	0.5955	0.62
PK	9	CP	9	typ	S	2.029	ICV 2 ppm (101.5%)
PK	10	CP	10	typ	S	0.02674	M ICB
PK	11	CP	11	typ	S	0.02334	M PB
PK	12	CP	12	typ	S	1.654	N 9012106-01 2x = 3.308
PK	13	CP	13	typ	S	1.858	N 010 2x = 3.716
PK	14	CP	14	typ	S	1.758	015 2x = 3.516 3.308÷2=1.654 3.516-1.654=1.862÷1.55=120.1% Spike Rec
PK	15	CP	15	typ	S	1.888	02 2x = 3.776
PK	16	CP	16	typ	S	1.894	03 2x = 3.788
PK	17	CP	17	typ	S	1.886	N 04 2x = 3.772
PK	18	CP	18	typ	S	1.924	05 2x = 3.848
PK	19	CP	19	typ	S	1.924	06 2x = 3.848
PK	20	CP	20	typ	S	1.893	07 2x = 3.786
PK	21	CP	21	typ	S	1.229	N CCV 1.24 ppm (99.1%)
PK	22	CP	22	typ	S	0.02833	M CCB
PK	23	CP	23	typ	S	1.764	08 2x = 3.528
PK	24	CP	24	typ	S	1.856	09 2x = 3.712
PK	25	CP	25	typ	S	1.915	N 10 2x = 3.830
PK	26	CP	26	typ	S	1.882	11 2x = 3.764
PK	27	CP	27	typ	S	1.905	12 2x = 3.810
PK	28	CP	28	typ	S	1.913	13 2x = 3.826
PK	29	CP	29	typ	S	1.877	14 2x = 3.754
PK	30	CP	30	typ	S	1.902	15 2x = 3.804
PK	31	CP	31	typ	S	1.906	16 2x = 3.812
PK	32	CP	32	typ	S	1.894	17 2x = 3.788
PK	33	CP	33	typ	S	1.285	CCV 1.24 ppm (103.9%)
PK	34	CP	34	typ	S	0.03448	M CCB
PK	35	CP	35	typ	S	1.796	18 2x = 3.592
PK	36	CP	36	typ	S	1.862	19 2x = 3.724
PK	37	CP	37	typ	S	1.862	20 2x = 3.724
PK	38	CP	38	typ	S	1.853	9012109-01 2x = 3.706
PK	39	CP	39	typ	S	1.846	010 2x = 3.692
PK	40	CP	40	typ	S	1.736	015 2x = 3.472 3.706÷2=1.853 3.472-1.853=1.619÷1.55=104.5% Spike Recov
PK	41	CP	41	typ	S	1.833	02 2x = 3.666
PK	42	CP	42	typ	S	3.288	03 Straight
PK	43	CP	43	typ	S	1.854	04 2x = 3.708
PK	44	CP	44	typ	S	1.863	05 2x = 3.726
PK	45	CP	45	typ	S	1.291	CCV 1.24 ppm (104.19%)
PK	46	CP	46	typ	S	0.03247	M CCB
PK	47	CP	47	typ	S	1.789	06 2x = 3.578
PK	48	CP	48	typ	S	1.823	07 2x = 3.646
PK	49	CP	49	typ	S	1.817	N 08 2x = 3.634
PK	50	CP	50	typ	S	1.824	09 2x = 3.648
PK	51	CP	51	typ	S	1.834	10 2x = 3.668
PK	52	CP	52	typ	S	1.828	11 2x = 3.656

000016

NO_3/NO_2

PK	54	CP	54	typ	S	1.845 13 2x = 3.690
PK	55	CP	55	typ	S	1.863 14 2x = 3.730
PK	56	CP	56	typ	S	1.837 15 2x = 3.674
PK	57	CP	57	typ	S	1.309 CW 1.24 PPM (105.6 %)
PK	58	CP	58	typ	S	0.03398 MCLB
PK	59	CP	59	typ	S	1.799 16 2x = 3.598
PK	60	CP	60	typ	S	1.835 17 2x = 3.670
PK	61	CP	61	typ	S	1.818 18 2x = 3.636
PK	62	CP	62	typ	S	1.838 19 2x = 3.676
PK	63	CP	63	typ	S	1.285 CW 1.24 PPM (103.6 %)
PK	64	CP	64	typ	S	0.03365 MCLB
PK	65	CP	65	typ	H	3.098
PK	66	CP	66	typ	L	0.6151
PK	67	CP	67	typ	L	0.6107
PK	68	CP	68	typ	G	3.154

Last base 162

Sample statistics

Anal	level	cups	avg	std dev	cv
1	all	56	1.598	0.653	41%

Anal 1: linear fit
Carryover factor: 0.30%.

Chart saved to file B:9100705.CHR.

text file B:9100705.TXT has been saved to disk.

SKINNER & SHERMAN LABORATORIES

TRAACS 800 SYSTEM BENCH SHEET
GENERAL ANALYSIS

DATE: 1/7/91
ANALYST: L. GOHAVI
METHOD:

Chloride 325.2

RUN ID'S		WORKORDER
91007	- 02	9012106
	-	9012109
	-	9012129
	-	9012143
	-	9012150
	-	9012169
		9012177
		9012215
		9012217

STANDARDS:	NAME	SOURCE	PREPARED
ICV	4 P987	(52.1 ppm)	
CCV	50 ppm		
ICB/CCB			

POS	LAB ID	SAMPLE ID	COMMENTS
01	Prep		
02	50ppm		
03	25		
04	50		
05	75		
06	100		
07	100		
08	5		
09	5		
10	ICV/CCS		
11	ICB		
12	Pb		
13	9012106-01		
14		01D	
15		01S	
16		02	
17		03	
18		04	
19		05	
20		06	
21		BLANK	
22	CW		
23	CCB		
24		07	
25		08	
26		09	
27		10	
28		11	
29		12	
30		13	
31		14	
32		15	
33		16	
34	CW		
35	CCB		

relabs 0.7200

Spike = Inl sample Plus Inl 50ppm Thus 25ppm

84

000C18

SKINNER & SHERMAN LAB
TRAACS BENCH SHEET
DATE: 1/7/91

RUN ID: 90007

POS	LAB ID	SAMPLE ID	COMMENTS
36	17		
37	18		
38	19		
39	20		
40	9012109-01		
41	01D		
42	01S		
43	02		
44	03		
45	Blank		
46	CW		
47	CLB		
48	04		
49	05		
50	06		
51	07		
52	08		
53	09		
54	10		
55	11		
56	12		
57	Blank		
58	CW		
59	CLB		
60	13		
61	14		
62	15		
63	16		
64	17		
65	18		
66	19		
67	9012079-01		
68	02		
69	~~Blank~~ 02D		
70	CW		
71	CLB		
72	~~9012140-02~~ 02S		
73	9012143-01		
74	9012150-01		
75	02		
76	9012169-01		
77	02		
78	03		
79	04		
80	05		
81	~~Blank~~ 9012140-02		
82	CW		
83	CLB		
84	9012197-01		
85	02		

SKINNER & SHERMAN LAB
TRAACS BENCH SHEET
DATE: 1/7/91

RUN ID: 91007

	POS	LAB ID	SAMPLE ID	COMMENTS
E6	36	SC12213-01		
E7	37	SC12213-02		
E8	38	03		
E9	39	04		
90	40	05		
91	41	Blank		
92	42	CCV		
93	43	CCB		
	44			
	45			
	46			
	47			
	48			
	49			
	50			
	51			
	52			
	53			
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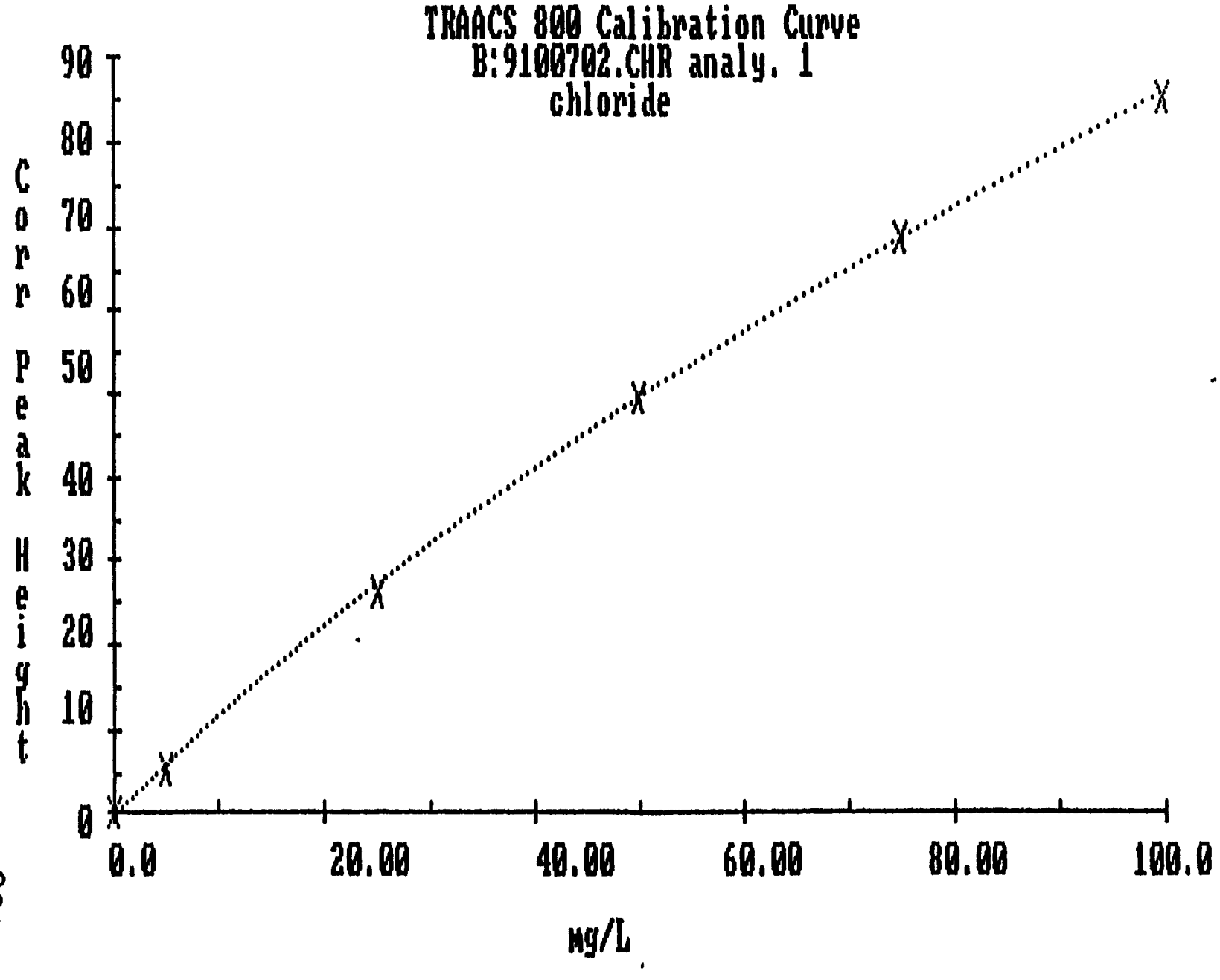
	83			
	84			
	85			

DW 1/7/91


TRAACS 800 Calibration Curve
B:9100702.CHR analy. 1
chloride
Corr Peak Height
90
80
70
60
50
40
30
20
10
0
0.0
20.00
40.00
60.00
80.00
100.0
mg/L

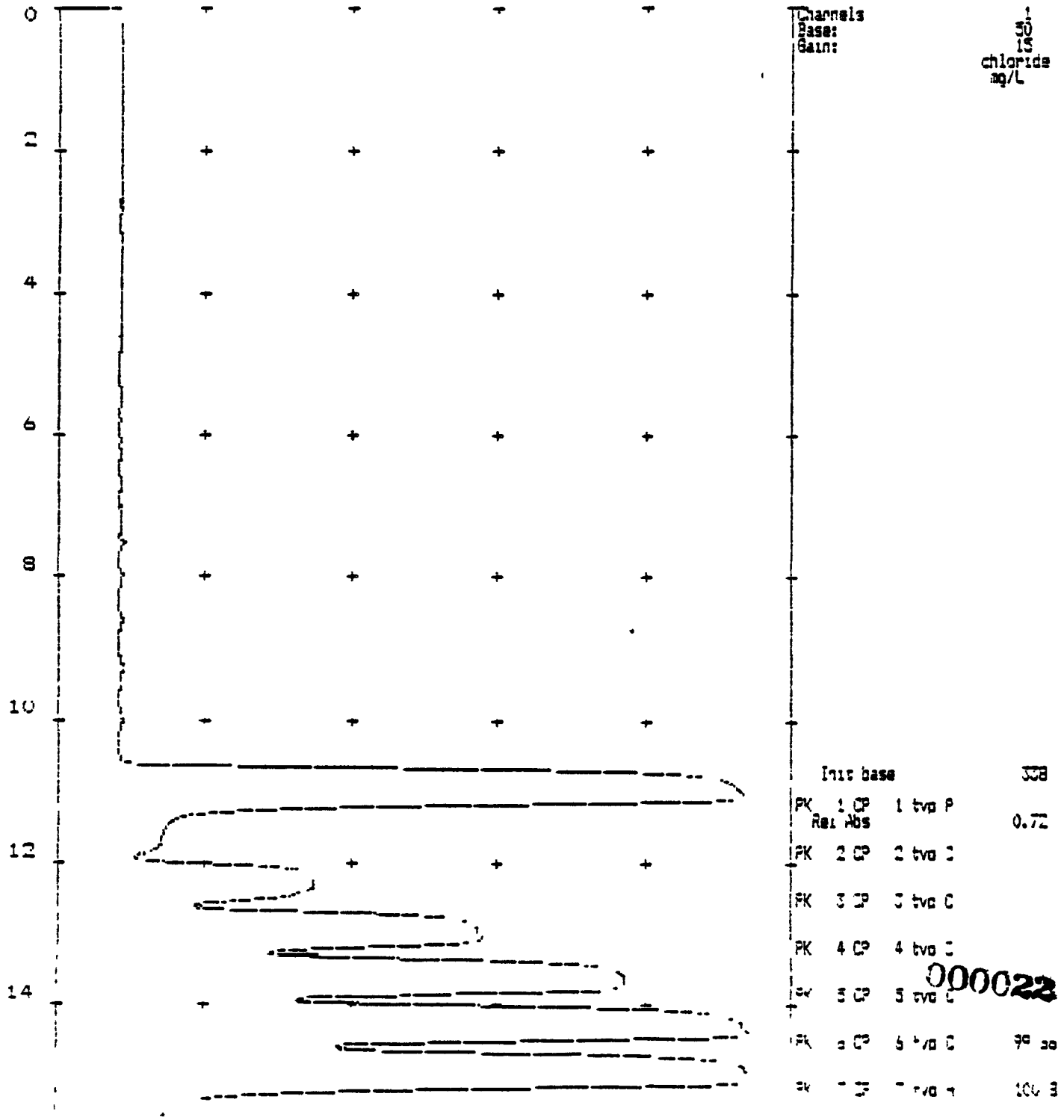
000021

Chart minimum: 0%, maximum 100%
Active analyses: 1

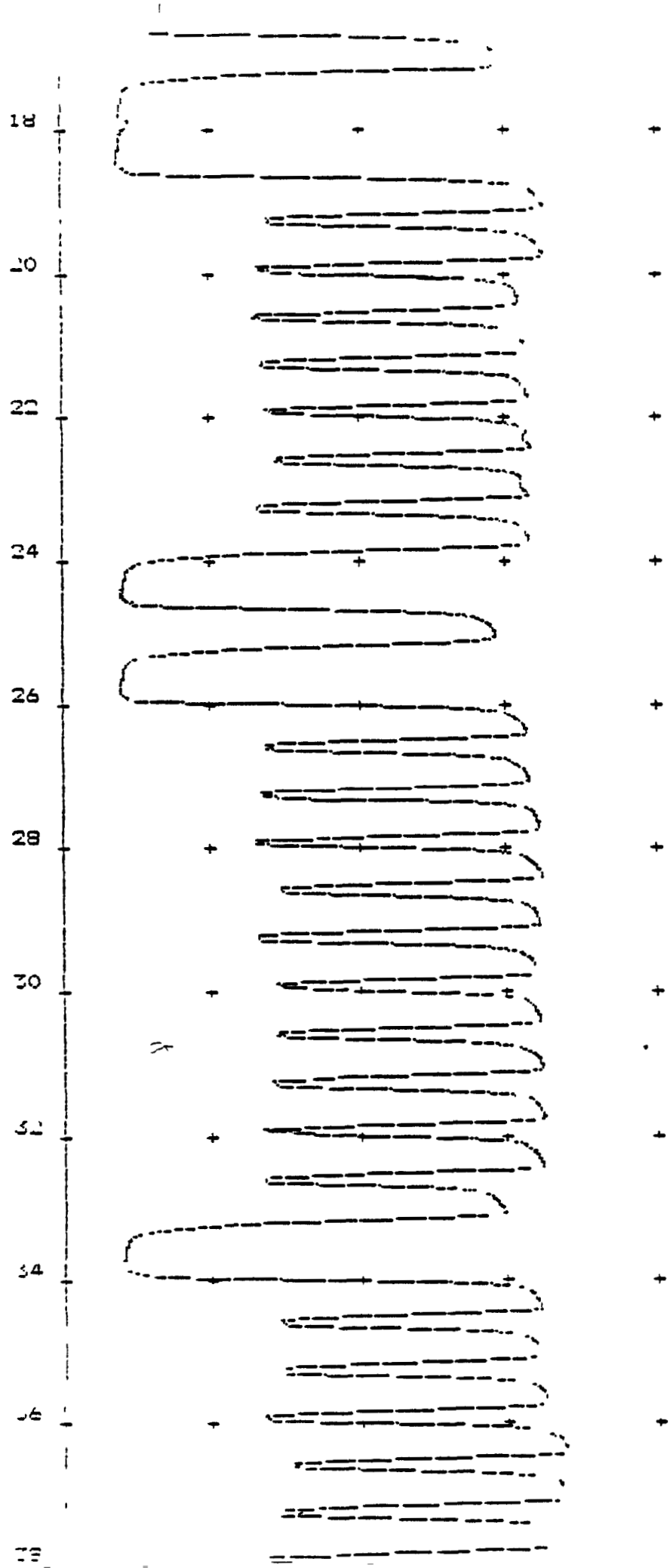
Input Filename: B:CHLOR.INP
Time: 13:26: Date: 01-07-91
Operator: NEEDHAM

Comment: commercial chloride with five calibrants

There are 15548416 (bytes) free on disk.
File B:9100702.CHR will take approximately 14120 (bytes).

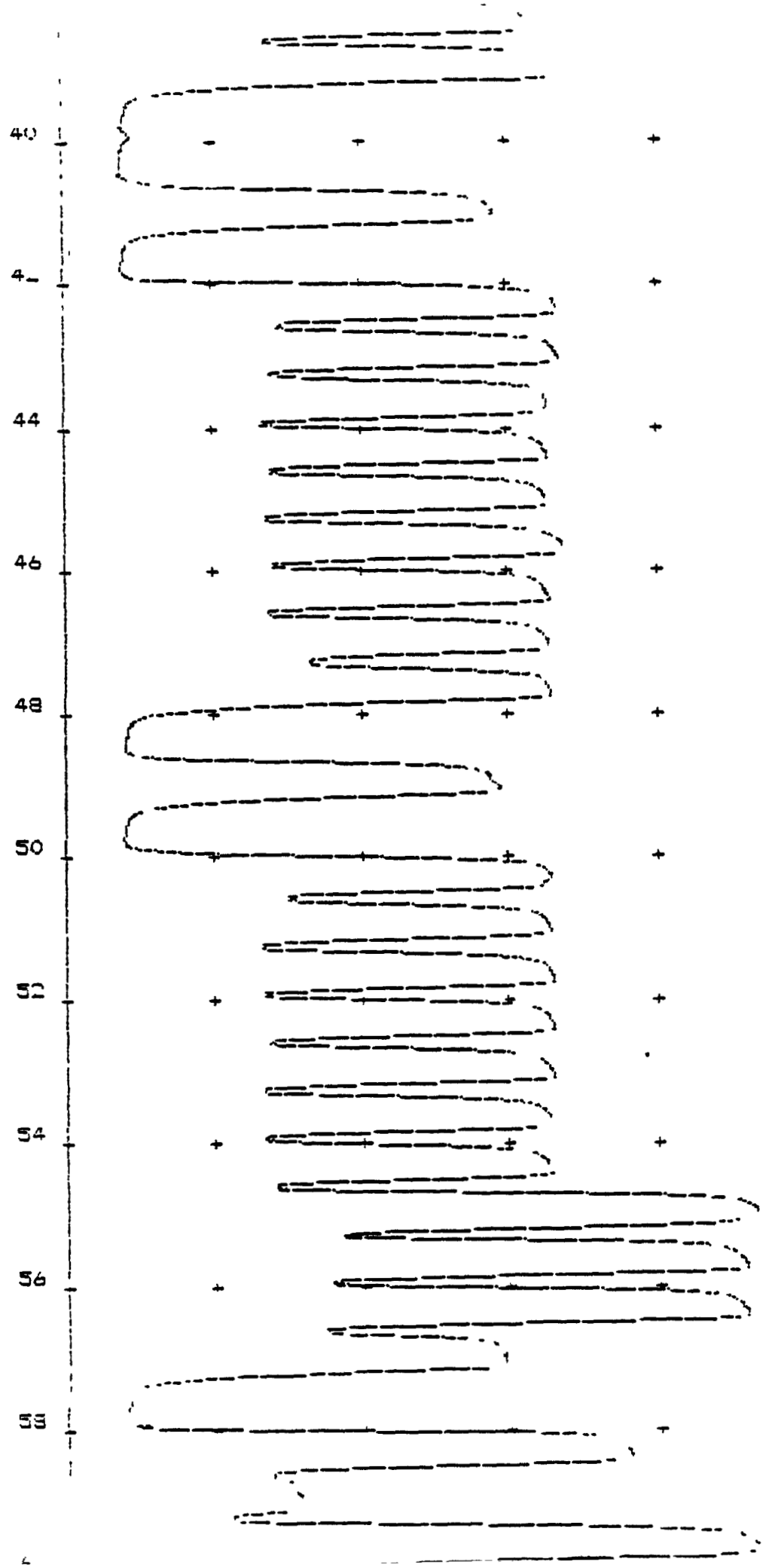


000022



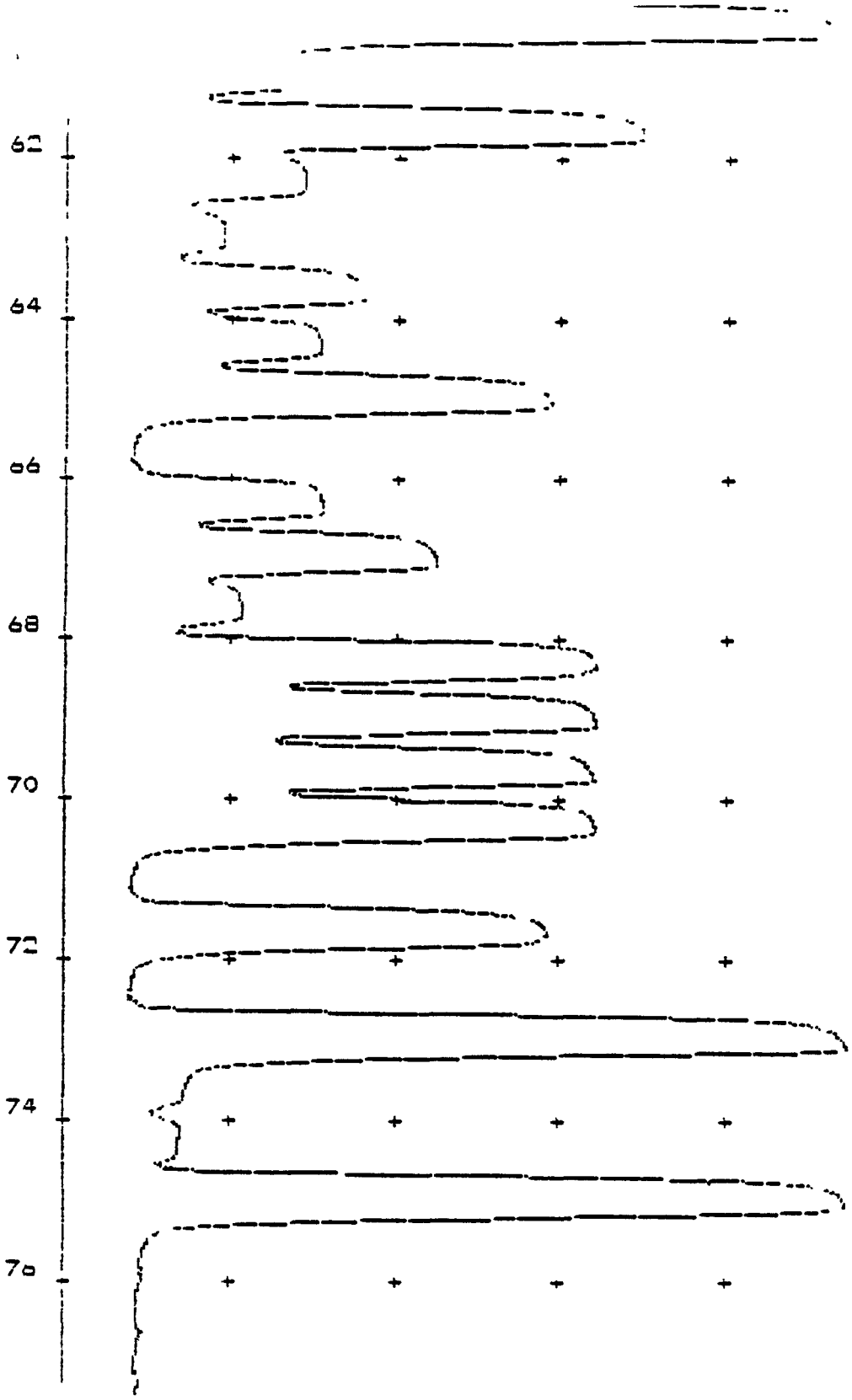
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
PK	[illegible]	CP	10	typ S	31.[illegible]
PK	11	CP	11	typ S	-0.[illegible] M
PK	12	CP	12	typ S	-0.2220 M
PK	13	CP	13	typ S	59.09
PK	14	CP	14	typ S	59.15
PK	15	CP	15	typ S	55.09
PK	16	CP	16	typ S	56.31
PK	17	CP	17	typ S	56.60
PK	18	CP	18	typ S	57.09
PK	19	CP	19	typ S	56.66
PK	20	CP	20	typ S	56.85
PK	21	CP	21	typ S	0.08622 M
PK	22	CP	22	typ S	51.06
PK	23	CP	23	typ S	-0.02953 M
PK	24	CP	24	typ S	56.51
PK	25	CP	25	typ S	56.60 N
PK	26	CP	26	typ S	58.49
PK	27	CP	27	typ S	58.74
PK	28	CP	28	typ S	58.46
PK	29	CP	29	typ S	58.46
PK	30	CP	30	typ S	58.34
PK	31	CP	31	typ S	58.96
PK	32	CP	32	typ S	59.06
PK	33	CP	33	typ S	58.74 N
PK	34	CP	34	typ S	52.11
PK	35	CP	35	typ S	0.08622 M
PK	36	CP	36	typ S	58.39
PK	37	CP	37	typ S	58.39
PK	38	CP	38	typ S	59.71
PK	[illegible]	[illegible]	[illegible]	[illegible]	62.67
[illegible]	[illegible]	[illegible]	40	typ S	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	typ S	[illegible]

000023



PK	43	CP	43	typ	S	61.[illegible]
PK	44	CP	44	typ	S	0.1923 M
PK	45	CP	45	typ	S	0.1451 M
PK	46	CP	46	typ	S	50.64
PK	47	CP	47	typ	S	0.04761 M
PK	48	CP	48	typ	S	61.50
PK	49	CP	49	typ	S	61.39
PK	50	CP	50	typ	S	59.75
PK	51	CP	51	typ	S	59.90
PK	52	CP	52	typ	S	59.93
PK	53	CP	53	typ	S	62.69
PK	54	CP	54	typ	S	60.06
PK	55	CP	55	typ	S	59.81 M
PK	56	CP	56	typ	S	60.12
PK	57	CP	57	typ	S	0.1633 M
PK	58	CP	58	typ	S	51.33
PK	59	CP	59	typ	S	0.04761 M
PK	60	CP	60	typ	S	60.03
PK	61	CP	61	typ	S	60.22
PK	62	CP	62	typ	S	60.52
PK	63	CP	63	typ	S	60.66
PK	64	CP	64	typ	S	60.56
PK	65	CP	65	typ	S	60.44
PK	66	CP	66	typ	S	60.15
PK	67	CP	67	typ	S	98.84
PK	68	CP	68	typ	S	96.72
PK	69	CP	69	typ	S	96.58
PK	70	CP	70	typ	S	51.90
PK	[illegible]	CP	[illegible]	typ	S	0.2473 M
PK	[illegible]	CP	[illegible]	typ	S	[illegible].84
PK	[illegible]	CP	[illegible]	typ	S	[illegible]

000024



PK	75	CP	75	typ	S	[illegible]
PK	76	CP	76	typ	S	[illegible]
PK	77	CP	77	typ	S	25.55
PK	78	CP	78	typ	S	18.26
PK	79	CP	79	typ	S	9.318
PK	80	CP	80	typ	S	25.44
PK	81	CP	81	typ	S	20.22
PK	82	CP	82	typ	S	51.48
PK	83	CP	83	typ	S	0.1248 M
PK	84	CP	84	typ	S	20.63
PK	85	CP	85	typ	S	35.22
PK	86	CP	86	typ	S	11.20
PK	87	CP	87	typ	S	58.37
PK	88	CP	88	typ	S	58.43
PK	89	CP	89	typ	S	58.21
PK	90	CP	90	typ	S	58.34
PK	91	CP	91	typ	S	0.1442 M
PK	92	CP	92	typ	S	50.97
PK	93	CP	93	typ	S	0.08622 M
PK	94	CP	94	typ	H	100.9
PK	95	CP	95	typ	L	5.198
PK	96	CP	96	typ	L	4.868
PK	97	CP	97	typ	G	100.7

Last base 363

Time: 13:26: Date: 01-07-91
Operator: NEEDHAM

Comment: commercial chloride with five calibrants

000025

Channels 1
Base: 50
Gain: 15

chloride

Base drift correction made
Carryover correction made
Gain drift correction made

Init Base						ICS	
PK	1	CP	1	typ	P	99.22	Primer
Rel Abs						0.72	
PK	2	CP	2	typ	C	4.773	@5.0 ppm DB 1/7/91
PK	3	CP	3	typ	C	24.45	25
PK	4	CP	4	typ	C	50.22	50
PK	5	CP	5	typ	C	75.48	75
PK	6	CP	6	typ	C	99.66	100
PK	7	CP	7	typ	H	100.7	100
PK	8	CP	8	typ	L	4.697	5
PK	9	CP	9	typ	L	4.812	5
PK	10	CP	10	typ	S	51.75	ICV KCS 52.1 (99.3%)
PK	11	CP	11	typ	S	-0.1420	M ICB
PK	12	CP	12	typ	S	-0.1799	M Pb
PK	13	CP	13	typ	S	59.18	9012106-01
PK	14	CP	14	typ	S	59.02	01D
PK	15	CP	15	typ	S	54.94	01S 59.18/2 = 29.59 54.94 − 29.59 = 25.35 ÷ 25 = 101.4 % Spike Recovery
PK	16	CP	16	typ	S	56.37	02
PK	17	CP	17	typ	S	56.45	03
PK	18	CP	18	typ	S	56.94	04
PK	19	CP	19	typ	S	56.50	05
PK	20	CP	20	typ	S	56.69	06
PK	21	CP	21	typ	S	-0.05020	M Blank
PK	22	CP	22	typ	S	51.08	CCV (102.1 %)
PK	23	CP	23	typ	S	-0.1647	M CCB
PK	24	CP	24	typ	S	56.54	07
PK	25	CP	25	typ	S	56.41	N 08
PK	26	CP	26	typ	S	58.31	09
PK	27	CP	27	typ	S	58.55	10
PK	28	CP	28	typ	S	58.26	11
PK	29	CP	29	typ	S	58.26	12
PK	30	CP	30	typ	S	58.13	13
PK	31	CP	31	typ	S	58.75	14
PK	32	CP	32	typ	S	58.84	15
PK	33	CP	33	typ	S	58.52	N 16
PK	34	CP	34	typ	S	51.86	CCV (103.7 %)
PK	35	CP	35	typ	S	-0.1139	M CCB
PK	36	CP	36	typ	S	58.57	17
PK	37	CP	37	typ	S	58.35	18
PK	38	CP	38	typ	S	59.47	19
PK	39	CP	39	typ	S	62.45	20
PK	40	CP	40	typ	S	62.47	9012109-01
PK	41	CP	41	typ	S	62.05	01D
PK	42	CP	42	typ	S	56.69	01S 62.47/2 = 31.24 % 56.69 − 31.24 = 25.45/25 = 101.8 % Spike Rec.
PK	43	CP	43	typ	S	61.52	02
PK	44	CP	44	typ	S	-0.08267	M 03
PK	45	CP	45	typ	S	-0.2752	M Blank
PK	46	CP	46	typ	S	50.54	CCV (101.1 %)
PK	47	CP	47	typ	S	-0.2113	M CCB
PK	48	CP	48	typ	S	61.74	04
PK	49	CP	49	typ	S	61.60	05
PK	50	CP	50	typ	S	59.44	06
PK	51	CP	51	typ	S	59.60	07
PK	52	CP	52	typ	S	59.62	08
PK	53	CP	53	typ	S	62.39	09
PK	54	CP	54	typ	S	59.73	10
PK	55	CP	55	typ	S	59.48	N 11
PK	56	CP	56	typ	S	59.80	12
PK	57	CP	57	typ	S	-0.1664	M Blank
PK	58	CP	58	typ	S	51.17	CCV (102.3 %)
PK	59	CP	59	typ	S	-0.2755	M CCB
PK	60	CP	60	typ	S	59.31	13 <9.97 14

000026

PK	52	CP	52	typ	S	60.13	15
PK	53	CP	53	typ	S	60.30	16
PK	54	CP	54	typ	S	60.20	17
PK	55	CP	55	typ	S	60.07	18
PK	56	CP	56	typ	S	59.78	19
PK	57	CP	57	typ	S	98.69	9012029-01
PK	58	CP	58	typ	S	96.43	02
PK	59	CP	59	typ	S	96.28	021)
PK	70	CP	70	typ	S	51.38	CW (102.8)
PK	71	CP	71	typ	S	-0.1470	M CW3
PK	72	CP	72	typ	S	73.74	025 9643/2 = 48.22 73.74 48.22 = 25.52/25 = 102.1% Spike Recovery
PK	73	CP	73	typ	S	20.55	9012143-01
PK	74	CP	74	typ	S	99.20	N 9012150-01
PK	75	CP	75	typ	S	97.37	02
PK	76	CP	76	typ	S	17.07	9012169-01
PK	77	CP	77	typ	S	65.30	02
PK	78	CP	78	typ	S	17.74	03
PK	79	CP	79	typ	S	8.921	04
PK	80	CP	80	typ	S	25.06	05
PK	81	CP	81	typ	S	19.78	9012140-02
PK	82	CP	82	typ	S	51.12	CW (102.2%)
PK	83	CP	83	typ	S	-0.3238	M CW3
PK	84	CP	84	typ	S	20.25	9012177-01
PK	85	CP	85	typ	S	34.79	02
PK	86	CP	86	typ	S	10.71	~~9012219~~ 9012213-01
PK	87	CP	87	typ	S	58.06	9012217-02
PK	88	CP	88	typ	S	57.95	03
PK	89	CP	89	typ	S	57.72	04
PK	90	CP	90	typ	S	57.85	05
PK	91	CP	91	typ	S	-0.3591	M Blank
PK	92	CP	92	typ	S	50.64	CW (101.3%)
PK	93	CP	93	typ	S	-0.4132	M CW3
PK	94	CP	94	typ	H	100.9	
PK	95	CP	95	typ	L	4.565	
PK	96	CP	96	typ	L	4.434	
PK	97	CP	97	typ	G	100.7	
Last base						365	

Sample statistics

Anal	level	cups	avg	std dev	cv
1	all	84	46.69	26.7	57%

Anal 1: quadratic fit
Carryover factor: 0.30%.

Chart saved to file B:9100702.CHR.

text file B:9100702.TXT has been saved to disk.

DFC

Alkalinity. STO Methods 403A — 12.20.90

To pH 4.5 — #9012109

standardization of H_2SO_4

Ref. Scotts STO methods of Chem. analysis

vol. II p. 2194

~~0.0486~~ $\frac{0.0426g\ Na_2CO_3}{40.3 \times 0.053} = 0.0199N\ H_2SO_4$

				Sample #	pH	Result
ICV 1.25	12109-01 21.2	12109-02 21.5	9012109-01		8.15	421.88
0.00	0.00	0.00		-02	7.95	427.85
1.25mL	21.2mL	21.5mL		-03	8.04	423.87
				-04	7.99	437.80
12109-03 21.3	12109-04 22.0	12109-05 20.9		-05	7.95	415.91
0.00	0.00	0.00		-06	7.56	380.09
21.3 mL	22.0mL	20.9mL		-07	7.99	386.06
				-08	7.45	380.09
12109-06 19.1	12109-07 19.4	12109-08 19.1		-09	7.79	382.08
0.00	0.00	0.00		-10	7.33	378.10
19.1 mL	19.4 mL	19.1mL		-11	8.05	388.05
				-12	7.58	382.08
12109-09 19.2	~~DFC~~ 12109-10 19.0	12109-11 19.5		-13	7.96	390.04
0.00	0.00	0.00		-14	8.07	419.89
19.2mL	19.0mL	19.5mL		-15	8.01	411.93
				-16	8.04	427.85
12109-12 19.2	12109-13 19.6	12109-14 21.1		-17	7.84	398.00
0.00	0.00	0.00		-18	8.05	437.80
19.2mL	19.6mL	21.1mL		-19	8.04	419.89
				ICV(WP987)		124.88
12109-15 20.7	12109-16 21.5	12109-17 20.0			TRUE VALUE	27.0
0.00	0.00	0.00		-01D		419.89
20.7mL	21.5mL	20.0mL				
12109-18 22.0	12109-19 21.1	-01D 21.1				
0.00	0.00	0.00				
22.0mL	21.1mL	21.1mL				

000C28

$\frac{mls \times N \times 50{,}000}{mls\ sample} = mg/L\ CaCO_3$

50 mls sample used for each analysis

Fluoride

Bob Bennett

PROCEDURE: Add 5 mls sample to cup
Add 5 mls buffer SOIN
Stir one minute and read

Sample/STD	MV	Results (mg/L)	
0ppm	368		
1.0	293		
5.0	252	r = 0.9999	
10.0	233		
ICV	3.8 ~~297~~ 292	1.046	True value 1.0 limits 0.89 - 1.0 ~~0.89~~
ICB	365	<	
Pb	367	<	
9012106-01	291	1.09	1.09 ÷ 2 = .545
010	297	<1.0 ~~0.56~~	2.85 - .545 = 2.305
015	266	2.85	2.305 ÷ 2.5 = 92.2% Spike Recov
02	293	1.01	
03	292	1.05	Spike 2.5 ml 5ppm
04	292	1.05	Plus 2.5 ml sample
05	293	1.01	Spiked at 2.5 ppm
06	293	1.01	
07	293	1.01	
CCV (5ppm)	253	4.70	(94.0%)
CCB	360	<	
08	294	<	
09	293	1.01	
10	296	<	
11	293	1.01	
12	296	<	
13	295	<	
14	302	<	
15	296	<	
16	297	<	
17	296	<	
CCV STAN	252	4.89	(97.8%)
CCB	363	<	
18	297	<	
19	296	<	

Fluoride Cont. Page 2 of 3

Sample/STD	MU		Result (mg/L)	
20	296		< 1	
9012109-01	294	<1	~~< 0.97~~	
010	294	<1	~~< 0.97~~	
015	267		2.74	.97÷2=.485 2.74−.485=
02	293		1.01	
03	294		<	
04	293		1.01	
05	295		<	
CCV SPIK	252		4.89	(97.8%)
CCB			<	
06	293		1.01	
07	294		<	
08	294		<	
09	295		<	
10	294		<	
11	293		1.01	
12	293		1.01	
13	293		1.01	
14	294		<	
15	295		<	
CCV SPIK	253		4.70	(94.0%)
CCB	362		<	
16	293		1.01	
17	294		<	
18	294		<	
19	293		1.01	
9011281-02	293		1.01	
03	293		1.01	
04	292		1.05	
05	292		1.05	
9012117-02	345		<	
9012190-01	358		<	
CCV SPIK	253		4.70	(94.0%)
CCB	359		<	
9012177-01	359		<	
02	361		<	

Spike 2.5ml
25ml S
Spikeda
2.355÷25=90.2
Spike Reco

Sample/STD	mV	Result (mg/L)	
S012217-02	294	<	
03	293	1.01	
04	294	<	
05	293	1.01	
CCV (5PPM)	255	4.35	(87.0%)
CCB	361	<	

pH

calibrated at pH=4 & pH=7

12/11/90

	pH
9012108	
01	8.17
02	7.91
03	7.98
04	8.02
05	7.89
06	7.62
07	7.90
12/12	
08	7.51
09	7.82
10	7.34
11	8.00
12	7.62
13	7.91
14	8.09
15	7.96
16	8.07
17	7.81
18	8.01
19	7.98

[SULFATES] BY STANDARD METHODS 426C — JON S THOMAS

1/7/91

① 20 mls of Buffer
② add $BaCl_2$ + Stir 1 min
③ after 6 min read @ 420 nm

Sample/STD	sample vol.	abs w/o $BaCl_2$	abs w/ $BaCl_2$	RESULT
0	100 ml	0.000	0.000	
5 ppm			0.000	
10 ppm			0.019	
15 ppm			0.039	
30 ppm			0.115	
40 ppm			0.171	
			~~0.000~~ SST	
(CS) ICV (20 ppm)		0.067	~~0.000~~ SST	18.5 (93%)
CCB			0.000	0
PB			0.000	0
9012106-01	50 ml	0.000	0.096	25.1 (x2) = 50.2
-02			0.097	25.3 (x2) = 50.6
-03			0.105	27.1 (x2) = 54.2
-04			0.098	25.6 (x2) = 51.2
-05			0.070	19.2 (x2) = 38.4
-06			0.076	20.6 (x2) = 41.2
-07			0.115	29.4 (x2) = 58.8
-08			0.123	31.2 (x2) = 62.4
-08D			0.121	30.7 (x2) = 61.4
CCV (25 ppm)	100 ml		0.098	25.6
CCB	100 ml		0.000	0
-08-S	25 ml		0.102	26.4 (x4) = 105.6
-09	50 ml		0.095	24.9 (x2) = 49.8
-10			0.084	22.4 (x2) = 44.8
-11			0.091	24.0 (x2) = 48.0
-12			0.071	19.5 (x2) = 39.0
-13			0.074	20.1 (x2) = 40.2
-14			0.074	20.1 (x2) = 40.2
-15			0.075	20.4 (x2) = 40.8
-16			0.075	20.4 (x2) = 40.8

[SULFATES: CONT.] BY STANDARD METHODS 426C JONS T. THOMAS
1/7/91

Sample/STD	sample vol.	Abs w/o Back	Abs w/Back	Result
9012106-17	50ml	0.000	0.092	24.2 (x2)=48.4
~~-18~~				
CCV (10ppm)	100ml		0.029	9.96 (99.6%)
CCB	100ml		0.000	0
-18	50ml		0.073	19.9 (x2)=39.8
-19			0.091	24.0 (x2)=48.0
-20			0.086	22.8 (x2)=45.6
9012109-01	50ml		0.087	23.1 (x2)=46.2
-02			0.079	21.2 (x2)=42.4
-03			0.075	20.4 (x2)=40.8
-04			0.081	21.7 (x2)=43.4
-05			0.082	21.9 (x2)=43.8
-06			0.101	26.2 (x2)=52.4
-07			0.108	27.8 (x2)=55.6
CCV (5ppm)	100ml		0.010	5.6
CCB	100ml		0.000	0
-08	50ml		0.085	22.6 (x2)
-08D			0.085	22.6 (x2) =45.2
-08S (5ppm)			0.104	26.9 (x2)=53.8
-09			0.097 ~~0.98~~ ~~85~~	25.3 (x2)=50.6
-10			0.083	22.2 (x2)=44.4
-11			0.080	21.4 (x2)=42.8
-12			0.098	25.6 (x2)=51.2
-13			0.094	24.6 (x2)=49.2
-14			0.102	26.5 (x2)=53.0
-15			0.099	25.8 (x2)=51.6
-16			0.079	21.2 (x2)=42.4
-17			0.082	21.9 (x2)=43.8
CCV (30ppm)	100ml		0.124	31.4
CCB	100ml		0.000	0
-18	50ml		0.078	21.0 (x2)=42.0
-19	50ml		0.087	23.0 (x2)=46.0

0000

[SULFATES cont.] BY STANDARD METHODS 426C JOAN E THOMAS

sample #	sample vol	abs. w/o BaCl2	abs. w/ BaCl2	Result	Qc
9012286-22	50 ml	0.000	0.150	37.3 (x2) = 74.6	
CCV (25ppm)	100ml	0.000	0.093	24.4	(97.6%)
CCB	100ml	0.000	0.000	0	—
-23	10ml	0.000	0.030	10.2 (x10) = 102.0	
-24	50ml		0.084	22.4 (x2) = 44.8	
=24D	50ml		0.083	22.2 (x2) = 44.4	
*(10ppm) = 24S	50ml		0.170	41.8 (x2) = 83.6	
=25	25ml		0.073	19.9 (x4) = 79.6	
9012288-01	25ml		0.083	22.2 (x4) = 888	
02	100ml		0.002	<5ppm	
03	50ml		0.165	40.7 (x2) = 81.4	
04	50ml		0.086	22.8 (x2) = 45.6	
05	25ml		0.103	26.7 (x4) = 106.8	
9011263-01	50ml		0.112	28.7 (x2) = 57.4	

N. Keenan
January 8, 1991

Specific Conductance

Sample #	ohmos	mult	Cell constant	temp	Result ohmos
LSS / ICU WP987	2500	10	0.01	20°C	235.71
ICB	890	0.1		20°C	1.02
Pb	895	0.1			1.02
9012106-01	840	100			960.0
01D	840	100			960.0
02	840	100			960.0
03	830	100			948.6
04	835	100			954.3
05	840	100			960.0
06	830	100			948.6
07	835	100			~~44~~954.3
08	835	100			954.3
09	840	100			960.0
10	840	100			960.0
11	840	100			960.0
12	835	100			954.3
13	840	100			960.0
14	840	100			960.0
15	835	100			954.3
16	840	100			960.0
17	840	100			960.0
18	830	100			948.6
19	830	100			948.6
20	840	100			960.0
9012109-01	835	100			954.3
01D	835	100			954.3
02	880	100			1005.7
03	835	100			954.3
04	830	100			948.6
05	810	100			925.7
06	840	100			960.0
07	840	100			960.0
08	840	100			960.0
09	840	100			960.0

000036

Meeshan
January E

Specific Conductance cont.

Sample #	uhmos	mult	Cellconstant	temp	Result
9012109-10	840	100	0.01	20°C	960.
11	820	100			937.
12	835	100			954
13	830	100			948
14	890	100			101=
15	840	100			960
16	860	100			98
17	810	100			92
18	890	100			101
19	820	100			93
9012140-01	1155	10			[illegible]
9012143-01	1160	10			13
WP 567	~~2500~~ 2490	10			284
Blank	880	0.1			1.01

Calculation:

$$\text{uhmos} \times \text{mult} \times \text{Cellconstant} \div 1 + 0.025(T-25)$$

.875

Weekend Nce

9012109	Minlab
TSS	TDS@180°C
01B 3ccml's	1ccml's
16.7566	43.1385
(4) 16.7563	43.0775
0.0003	0.0610
0.3 × 1000/300 = 1.0 mg/L ✓	61.0 × 10 = 610 mg/L ✓
02B 2ccml's	1ccml's
17.6891	49.7365
(5) 17.6880	49.6785
0.0011	0.0580
1.1 × 1000/200 = 5.5 mg/L ✓	58.0 × 10 = 580 mg/L ✓
03B 3ccml's	1ccml's
17.6090	48.4700
(6) 17.6080	48.4100
0.0010	0.0600
1.0 × 1000/300 = 3.33 mg/L ✓	60.0 × 10 = 600 mg/L ✓
04B 2ccml's	1ccml's
17.8322	48.5115
(19) 17.8300	48.4490
0.0022	0.0625
2.2 × 1000/200 = 11.0 mg/L ✓	62.5 × 10 = 625 mg/L ✓
05B 3ccml's	1ccml's
~~(22) 16.3520~~	17.5293
(44) 17.5270	48.5810
	48.5175
0.0013	0.0635
1.3 × 1000/300 = 4.33 mg/L ✓	63.5 × 10 = 635 mg/L ✓

000038

#12

Weekend Near

9-12-19

TSS	TDS @ 180°C
06B 2ccml's	1ccml's
17.3355	51.1055
(25) 17.3345	51.0480
0.0010	0.0575
$1.0 \times \frac{1000}{300} = 5.0$ mg/L	$57.5 \times 10 = 575$ mg/L
07B 3ccml's	1ccml's
17.4308	51.5820
(26) 17.4300	51.5240
0.0008	0.0580
$0.8 \times \frac{1000}{300} = 2.67$ mg/L	$58.0 \times 10 = 580$ mg/L
08B 2ccml's	1ccml's
19.2668	49.0955
(27) 19.2653	49.0365
0.0015	0.590
$1.5 \times \frac{1000}{200} = 7.5$ mg/L	$59.0 \times 10 = 590$ mg/L
09B 3ccml's	1ccml's
18.0569	51.5965
(40) 18.0565	51.5345
0.0004	0.620
$0.4 \times \frac{1000}{300} = 1.33$ mg/L	$620 \times 10 = 620$ mg/L
10B 3ccml's	1ccml's
20.1785	56.6220
(43) 20.1765	56.5640
0.0020	0.0580
$2.0 \times \frac{1000}{300} = 6.67$ mg/L	$580 \times 10 = 580$ mg/L

Weekend Nov

9/12/09

TSS	TDS @ 180
11 B 300 ml's	100 ml's
18.1254	48.4900
(VS) 18.1245	48.4300
0.0009	0.0600
0.9 x 1000/300 = 3.0 mg/L	60 x 10 = 600 mg/L
12 B 200 ml's	100 ml's
17.7016	50.3555
(3) 17.7003	50.2945
0.0013	0.0610
1.3 x 1000/200 = 6.5 mg/L	61.0 x 10 = 610 mg/L
13 B 300 ml's	100 ml's
19.6510	49.6565
(9) 19.6500	49.5960
0.0010	0.0605
1.0 x 1000/300 = 3.33 mg/L	60.5 x 10 = 605 mg/L
14 B 200 ml's	100 ml's
18.5752	48.6155
(12) 18.5735	48.5515
0.0017	0.0640
1.7 x 1000/200 = 8.5 mg/L	64.0 x 10 = 640 mg/L
15 B 200 ml	100 ml's
18.1434	52.8560
(14) 18.1416	52.7900
0.0016	0.0660
1.6 x 1000/200 = 8.0 mg/L	66.0 x 10 = 660 mg/L

000040

Woodward Nor

901209

TSS	TDS
16B 200ml's	100ml's
17.6465	52.0840
(31) 17.6450	52.0205
0.0015	0.0635
$1.5 \times \frac{1000}{200} = 7.5$ mg/L ✓	$63.5 \times 10 = 635$ mg/L ✓
17B 300ml's	100ml's
17.7337	51.6795
(32) 17.7325	51.0165
0.0012	0.0630
$1.2 \times \frac{1000}{300} = 4.0$ mg/L ✓	$63.0 \times 10 = 630$ mg/L ✓
18B 200ml's	100ml's
16.8892	52.5500
(36) 16.8875	52.4860
0.0017	0.0640
$1.7 \times \frac{1000}{200} = 8.5$ mg/L ✓	$64.0 \times 10 = 640$ mg/L ✓
19B 300ml's	100ml's
17.6255	49.8800
(68) 17.6240	49.8160
0.0015	0.0640
$1.5 \times \frac{1000}{300} = \cancel{4.0}$ 5.0 mg/L ✓	$64.0 \times 10 = 640$ mg/L ✓

000041

KZ 12/17

Quality Control Sample

WP 1187 Conc 1 12/2/90

Prepared by D.N

TSS 50 ml's

	16.2350
weight Beach (g)	16.2210
	0.0140

$14.0 \times \frac{1000}{500} = 28.0$ mg/L

TDS @ 180°C 100 ml's

	49.7215
weight Evap dish	49.6780
	0.0435

$43.5 \times \frac{1000}{100} = 435$ mg/L

12/10/90

QUESTIONS? CALL 800 23-3355 TOLL FREE

PACKAGE TRACKING NUMBER 9727723

9727723176

Date 12/6/90

RECIPIENT'S COPY

1 From (Your Name) Please Print: Brian Clay
Your Phone Number (Very Important): (303) 271-1421
Department/Floor No.
Company: Weatherford/Lyle Federal Services
Street Address: 1601 Tyburn St.
City: Fairfax State: CO ZIP Required: 20163

2 To (Recipient's Name) Please Print: Paula Boyle
Recipient's Phone Number (V
Department
Company: Trill-Skinner/Sherman
Exact Street Address (We Cannot Deliver to P.O. Boxes or P.O. Zip+4 Codes): 300 Second Ave
City: Whitman State: Mass ZIP Required: 02382

YOUR INTERNAL BILLING REFERENCE INFORMATION (First 24 characters will appear on invoice.): 1126-500

H IF HOLD FOR PICK-UP Print FEDEX Address Here
Street Address
City State ZIP Required

3 PAYMENT 1 [X] Sender 2 [ ] Recipient's FedEx Acct. No. 3 [ ] Third Party FedEx Acct. No. 4 [ ] Credit Card
5 [ ] Cash/Check

4 SERVICES (Check only one box)

Priority Overnight Service (Delivery by next business morning)
11 [X] YOUR PACKAGING
16 [ ] FEDEX LETTER*
12 [ ] FEDEX PAK*
13 [ ] FEDEX BOX
14 [ ] FEDEX TUBE

Standard Overnight Service (Delivery by next business afternoon)
51 [ ]
56 [ ] FEDEX LETTER*
52 [ ] FEDEX PAK*
53 [ ] FEDEX BOX
54 [ ] FEDEX TUBE

Economy Two-Day Service (formerly Standard Air) (Delivery by second business day)
70 [ ] HEAVYWEIGHT

Heavyweight Service (for items over 150 lbs.)

DELIVERY AND SPECIAL HANDLING (Check services required)
1 [ ] HOLD FOR PICK-UP
[X] DELIVER WEEKDAY
3 DELIVER SATURDAY
4 DANGEROUS GOODS
5 [ ]
6 DRY ICE
7 OTHER SPECIAL SERVICE
8 [ ]
9 SATURDAY PICK-UP
10 [ ]
11 [ ]
12 HOLIDAY DELIVERY

Packages	Weight in Pounds per Box	Total Declared Value
2	27	6000
Total 2	Total 27	Total 6000

BILL SHIPMENT (Check one box)
1 [ ] Recipient Bill 2 [ ] Third Party

Emp. No. | Date
[ ] Cash Received
[ ] Return Shipment
[ ] Third Party [ ] Chg. To Dist. [ ] Chg. To Hold
Street Address
City State Zip
Recipient's Signature: X Paula Boyle
Date/Time Received: 12/11/90 Fedex Employee Number: 9 30

Federal Exc
Base Charge
Declared Valu
Other 1
Other 2
Total Charges

VERSION DATE
PART
FORMAT
041

5 Fedex Signature
Date/Time

AIRBILL
PACKAGE TRACKING NUMBER 9727723

QUESTIONS? CALL 800-238-5355 TOLL FREE

9727723143

Date 12/6/90

RECIPIENT'S COPY

1 From (Your Name) Please Print: Brian Clay
Your Phone Number (Very Important): (303) 271-1421
Department/Floor No.
Company: Weatherford/Lyle Federal Services
Street Address: 1601 Tyburn St.
City: Fairfax State: CO ZIP Required: 22116

2 To (Recipient's Name) Please Print: Paula Boyle
Recipient's Phone Number (Ne
Department
Company: Trill-Skinner/Sherman
Exact Street Address (We Cannot Deliver to P.O. Boxes or P.O. Zip+4 Codes): 300 Second Ave
City: Whitman State: Mass ZIP Required: 02382

YOUR INTERNAL BILLING REFERENCE INFORMATION (First 24 characters will appear on invoice.): 1126-500

H IF HOLD FOR PICK-UP Print FEDEX Address Here
Street Address
City State ZIP Required

3 PAYMENT 1 [X] Sender 2 [ ] Recipient's FedEx Acct. No. 3 [ ] Third Party FedEx Acct. No. 4 [ ] Credit Card
5 [ ] Cash/Check

4 SERVICES (Check only one box)

Priority Overnight Service (Delivery by next business morning)
11 [X] YOUR PACKAGING
16 [ ] FEDEX LETTER*
12 [ ] FEDEX PAK
13 [ ] FEDEX BOX
14 [ ] FEDEX TUBE

Standard Overnight Service (Delivery by next business afternoon)
51 [ ]
56 [ ] FEDEX LETTER*
52 [ ] FEDEX PAK*
53 [ ] FEDEX BOX
54 [ ] FEDEX TUBE

Economy Two-Day Service (formerly Standard Air) (Delivery by second business day)

Heavyweight Service (for items over 150 lbs.)

DELIVERY AND SPECIAL HANDLING (Check services required)
1 [ ] HOLD FOR PICK-UP
[X] DELIVER WEEKDAY
3 DELIVER SATURDAY
4 DANGEROUS GOODS
5 DRY ICE
7 OTHER SPECIAL SERVICE

Packages	Weight in Pounds per Box	Total Declared Value
1	21	3000

Emp. No. | Date
[ ] Cash Received
[ ] Return Shipment
[ ] Third Party [ ] Chg. To Hold
Street Address
City State
Recipient's Signature: X Paula Boyle
Date/Time Received: 12/12/90 Fedex Employee Number: 9 30

Base Charge
041

5 Fedex Signature
Date/Time

→ See Sample # 0HCWC100K, CCC #020 for TMA-NORCAL For Rad Assay

Woodward-Clyde Consultants
Stanford Place 3, Suite 1000 — 4582 South Ulster Street Parkway
Denver Colorado 80237 — (303) 694-2770

Chain of Custody Record
CCC # 022

PROJECT NO. 22558 Task 500

SAMPLERS: (Signature) F.W. [illegible] / G. [illegible]

DATE	TIME	SAMPLE NUMBER	Metals	Wet Chem*	NO_3/NO_2					NUMBER OF CONTAINERS
12/10/90	1215	32CPF1014	X	X	X					3
	1315	32CPF1015	X	X	X					3
	1215	32CPF1016	X	X	X					3
	1315	32CPF1017	X	X	X					3
	1100	32CPF1018	X	X	X					3
	1215	32CPF1019	X	X	X					3
	1315	32CPF1020	X	X	X					3
	1500	32CPF1021	X	X	X					3
	1530	32CPF1022	X	X	X					3
	1500	32CPF1023	X	X	X					3
	1530	32CPF1024	X	X	X					3
	1500	34CPF1025	X	X	X					3
	1530	34CPF1026	X	X	X					3
		BZ Clow 12/10/90								
		TOTAL NUMBER OF CONTAINERS								39

REMARKS (Sample preservation handling procedures, etc.)
For TMA - Skinner/Shel

Matrix - Water

All samples stored on ice.

*Wet Chem:
Cl^-, F^-, Carb/Bicarb, pH, Sulfate, TDS, TSS, Cond.

- Metals Preserved w/ HNO_3 to pH<2
- NO_3/NO_2 Preserved w/ H_2SO_4 to pH<2

Contact personnel:
Brian Clow
(303) 279-4501 x205

RELINQUISHED BY (Signature)	DATE/TIME	RECEIVED BY (Signature)	RELINQUISHED BY (Signature)	DATE/TIME	RECEIVED BY (Signature)
BZ Clow	12/8/1730				[illegible] 12/12/90

METHOD OF SHIPMENT	SHIPPED BY (Signature)	COURIER (Signature)	RECEIVED FOR LAB BY (Signature)	DATE/TIME
		CCC	[illegible]	12/11 9:30

→ See Sample # 04CWC1006, COC # 020 at TMA/NORCAL for Rad Assay ←

Woodward-Clyde Consultants
Stanford Place 3 Suite 1000 4582 South Ulster Street Parkway
Denver Colorado 80237 (303) 694-2770

Chain of Custody Record
COC # 023

PROJECT NO. 22558 TASK 500

SAMPLERS: (Signature) P.W. Lynch

DATE	TIME	SAMPLE NUMBER	Metals	Wet Chem*	NO_3/NO_2					NUMBER OF CONTAINERS
12/10/90	0930	34CPF1027	X	X	X					3
	1030	34CPF1028	X	X	X					3
	0930	34CPF1029	X	X	X					3
	1030	34CPF1030	X	X	X					3
	0930	34CPF1031	X	X	X					3
	1030	34CPF1032	X	X	X					3
	1420	34CPF1033	X	X	X					3
	1520	34CPF1034	X	X	X					3
	1420	34CPF1035	X	X	X					3
	1520	34CPF1036	X	X	X					3
	1420	34CPF1037	X	X	X					3
	1520	34CPF1038	X	X	X					3

BR Clow 12/11/90

TOTAL NUMBER OF CONTAINERS: 36

REMARKS (Sample preservation handling procedures, etc.)
For TMA-Skimer/Sherman

Matrix – Water

All samples stored on ice.

*Wet Chem: Cl^-, F^-, Carb/Bicarb, pH, Sulfate, TDS, TSS, Conductivity.

– Metals preserved w/ HNO_3 to pH<2

– NO_3/NO_2 preserved w/ H_2SO_4 to pH<2

Last Shipment

Contact personnel:
Brian Clow
(303) 279-4501 x205

RELINQUISHED BY (Signature)	DATE/TIME	RECEIVED BY (Signature)	RELINQUISHED BY (Signature)	DATE/TIME	RECEIVED BY (Signature)
BR Clow	12/11/90 1600		000C 4:		S. Elizalde ~~000250~~

METHOD OF SHIPMENT	SHIPPED BY (Signature)	COURIER (Signature)	RECEIVED FOR LAB BY (Signature)	DATE/TIME
			[illegible]	12/12/90

TMA
Thermo Analytical Inc.

TMA/Norcal
2030 Wright Avenue
P.O. Box 4040
Richmond, CA 94804-0040

(415) 235-2633 Fax No. (415) 235-0438

December 12, 1990

Antonia Benney
TMA/Skinner & Sherman
300 Second Ave.
P.O. Box 521
Waltham MA 02254-0521

Dear Antonia

The samples you received 12/11/90 from Woodward Clyde on COC's 21, 22 and 23 are part of the same set of samples covered on the earlier Mixed Waste Work Plan for this project and can be handled similarly.

Sincerely

David Rodgers

David Rodgers

Radiation Safety Officer

cc: D Stuermer (Norcal)

000(4E

~~000251~~
2/12/9

TMA
Thermo Analytical Inc.

TMA/Norcal
2030 Wright Avenue
P O Box 4040
Richmond CA 94804-0040

(415) 235-2633 Fax No (415) 235-0438

RECEIVED
JAN - 4 1991
WCC/DENVER, COLORADO

January 3, 1991

Steve Baca
Woodward-Clyde
Stanford Place 3, Suite 612
4582 South Ulster Street Parkway
Denver, CO 80237

Dear Steve

Enclosed are the data packages that are related to the analytical requests by Brian Clow on Chain-of-Custody numbers 002, 006, and 012, received November 13, 21, and 27, 1990, respectively Radiochemical analyses related to this project will be reported separately

If upon review of the enclosed information you have questions, please feel free to give me a call

Sincerely,

Daniel H Stuermer, Ph D
Program Manager

DHS/dss

Enclosures

TMA
Thermo Analytical Inc.

Skinner & Sherman Laboratories Inc.
300 Second Avenue
Post Office Box 521
Waltham MA 02254-0521

(617) 890-7200

Federal Express #9286408~~515~~ 272
December 28, 1990

TMA/NORCAL
2030 Wright Avenue
Richmond ,CA 94804
Attention: Dan Steurmer

Dear To Whom It May Concern:

Enclosed are the results for the wet chemical analysis of twelve water samples recieved on November 13, 20, and 26, 1990. The samples were analyzed under Skinner and Sherman work order number 9011176.

Duplicate, matrix spike, blank, and laboratory control sample results are included in the quality control section of the report. The laboratory control samples are EPA QC samples where available or alternate source standards. The true values and recoveries are reported in the QC section of the report. All holding times were met for the various analysis. All raw data is included in the report. All analysis were performed in strict accordance with the methods specified in the report.

Please feel free to call if there are any questions concerning the enclosed.

Sincerely,

SKINNER & SHERMAN LABORATORIES

David N. Peterson
Assistant Laboratory Manager

 Skinner&Sherman REPORT Work Order # 90-11-176

Received: 11/15/90 12/28/90 15:55:06

REPORT TMA/NORCAL
TO 2030 Wright Avenue
Richmond, CA 94804

ATTEN Dan Steurmer

CLIENT WOODWARD NOR SAMPLES 12
COMPANY TMA/NORCAL
FACILITY Richmond, CA

PREPARED TMA / Skinner & Sherman Labs.
BY 300 Second Avenue
P.O. Box 521
Waltham, MA 02254

ATTEN Client Services
PHONE (617) 890-7200

CERTIFIED BY

CONTACT DP

Metals reported in CLP Data Package Format

WORK ID Woodward Clyde/Rocky Flats
TAKEN Woodward Clyde
TRANS
TYPE Mixed Wastes
P.O. #
INVOICE under separate cover

SAMPLE IDENTIFICATION	
01	01 CWC 1001, COC 001
02	02CWC1003
02	02WC1003
03	20GA07001
04	20GA05002
05	21GA01004
06	21GA01006
07	21GA02007
08	21GA08008
09	22GA01009
10	23GA01010
11	24GA01011
12	25GA01012

TEST CODES and NAMES used on this workorder	
CL W	Chloride - Aqueous
CO3 W	CARBONATE
F W	Fluoride - Aqueous
NO3NO2	Nitrate Plus Nitrite
PH W	pH - Aqueous
SO4 W	Sulfate - Aqueous
S COND	Specific Conductance
TAL M	TAL Metals - CLP Protocol
TDS	Total Dissolved Solids
TSS	Total Suspended Solids

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TMA
Thermo Analytical Inc.
Skinner & Sherman Laboratories Inc. 300 Second Avenue, P.O. Box 521, Waltham, Massachusetts 02254-0521 (617) 890-7200
1-800-4 LAB TEST FAX (617) 890-3883

Received: 11/15/90 Results by Sample

CWC

SAMPLE ID 01 CWC 1001, COC 001 SAMPLE # 01 FRACTIONS: A,B,C
Date & Time Collected 11/13/90 11:35:00 Category MIXED WASTE

CL_W	CO3_W	F_W	NO3NO2	PH_W	SO4_W
79.0 mg/L	359 mg CaCO3/L	1.1 mg/L	2.52 mg N/L	7.20 pH units	51.1 mg/L

S_COND	TDS	TSS
813 micromhos	615 mg/L	10.0 mg/L

CWC

SAMPLE ID 02WC1003 SAMPLE # 02 FRACTIONS: B,C
Date & Time Collected 11/21/90 Category WATER

CL_W	CO3_W	F_W	NO3NO2	PH_W	SO4_W
94.7 mg/L	399 mg CaCO3/L	1 0 mg/L	2 34 mg N/L	7.21 pH units	49.3 mg/L

S_COND	TDS	TSS
780 micromhos	645 mg/L	5 0 mg/L

Treat Blk

SAMPLE ID 20GA07001 SAMPLE # 03 FRACTIONS: A,B,C
Date & Time Collected 11/27/90 Category WATER

CL_W	CO3_W	F_W	NO3NO2	PH_W	SO4_W
<5.0 mg/L	<1 0 mg CaCO3/L	<1.0 mg/L	<0 25 mg N/L	6.10 pH units	<5.0 mg/L

S_COND	TDS	TSS
2.46 micromhos	<10 0 mg/L	<3.3 mg/L

FB

SAMPLE ID 20GA05002 SAMPLE # 04 FRACTIONS. A,B,C
Date & Time Collected 11/27/90 Category WATER

CL_W	CO3_W	F_W	NO3NO2	PH_W	SO4_W
<5.0 mg/L	<1 0 mg CaCO3/L	<1 0 mg/L	<0.25 mg N/L	5.39 pH units	<5.0 mg/L

S_COND	TDS	TSS
1.98 micromhos	<10 0 mg/L	<3.3 mg/L

FB

SAMPLE ID 21GA01004 SAMPLE # 05 FRACTIONS A,B,C
Date & Time Collected 11/27/90 Category WATER

CL_W	CO3_W	F_W	NO3NO2	PH_W	SO4_W
79 6 mg/L	384 mg CaCO3/L	<1 0 mg/L	1.53 mg N/L	7.31 pH units	51.6 mg/L

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TB

S_COND 791 micromhos TDS 555 mg/L TSS <3.3 mg/L

SAMPLE ID 21GA01006 SAMPLE # 06 FRACTIONS A,B,C
Date & Time Collected 11/27/90 Category WATER

CL_W 74.0 mg/L CO3_W 387 mg CaCO3/L F_W 1.1 mg/L NO3NO2 <0.25 mg N/L PH_W 8.11 pH units SO4_W 37.1 mg/L

S_COND 769 micromhos TDS 540 mg/L TSS <3.3 mg/L

SAMPLE ID 21GA02007 SAMPLE # 07 FRACTIONS. A,B,C
Date & Time Collected 11/27/90 Category WATER

CL_W 75.0 mg/L CO3_W 381 mg CaCO3/L F_W 1 1 mg/L NO3NO2 <0 25 mg N/L PH_W 8.00 pH units SO4_W 36.2 mg/L

S_COND 786 micromhos TDS 550 mg/L TSS <3 3 mg/L

SAMPLE ID 21GA08008 SAMPLE # 08 FRACTIONS A,B,C
Date & Time Collected 11/27/90 Category WATER

CL_W 73.9 mg/L CO3_W 385 mg CaCO3/L F_W 1 2 mg/L NO3NO2 <0.25 mg N/L PH_W 8.28 pH units SO4_W 37.1 mg/L

S_COND 780 micromhos TDS 550 mg/L TSS <3.3 mg/L

SAMPLE ID 22GA01009 SAMPLE # 09 FRACTIONS A,B,C
Date & Time Collected 11/27/90 Category WATER

CL_W 74.0 mg/L CO3_W 289 mg CaCO3/L F_W 1 0 mg/L NO3NO2 0 33 mg N/L PH_W 7.62 pH units SO4_W 35.3 mg/L

S_COND 677 micromhos TDS 505 mg/L TSS <3.3 mg/L

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Received: 11/15/90 Results by Sample

SAMPLE ID 23GA01010 SAMPLE # 10 FRACTIONS. A,B,C
Date & Time Collected 11/27/90 Category WATER

CL_W 73.9 mg/L	CO3_W 378 mg CaCO3/L	F_W 1.1 mg/L	NO3NO2 0.40 mg N/L	PH_W 8.01 pH units	SO4_W 44.3 mg/L
S_COND 791 micromhos	TDS 520 mg/L	TSS <3.3 mg/L			

SAMPLE ID 24GA01011 SAMPLE # 11 FRACTIONS. A,B,C
Date & Time Collected 11/27/90 Category WATER

CL_W 77.7 mg/L	CO3_W 351 mg CaCO3/L	F_W 1 0 mg/L	NO3NO2 <0 25 mg N/L	PH_W 7.95 pH units	SO4_W 56.1 mg/L
S_COND 786 micromhos	TDS 525 mg/L	TSS <3 3 mg/L			

SAMPLE ID 25GA01012 SAMPLE # 12 FRACTIONS: A,B,C
Date & Time Collected 11/27/90 Category WATER

CL_W 73 4 mg/L	CO3_W 326 mg CaCO3/L	F_W 1 0 mg/L	NO3NO2 <0 25 mg N/L	PH_W 7.62 pH units	SO4_W 39.4 mg/L
S_COND 726 micromhos	TDS 505 mg/L	TSS <3 3 mg/L			

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Received: 11/15/90 12/28/90 15:55:06

TMA/NORCAL

$\left(\frac{\text{spike result} - \text{sample result}}{\text{spike added}}\right) 100\%$

QUALITY CONTROL

** NITRATE/NITRITE **

1. MATRIX SPIKE

SAMPLE ID	SAMPLE RESULT	SPIKE ADDED	SPIKE RESULT	% RECOVERY
9011176-08	<0.25 mg/L	1.23 mg/L	1.55 mg/L	126 0

$\left(\frac{1.55 - 0}{1.23}\right) 100\% = 126$

2. DUPLICATE

SAMPLE ID	SAMPLE RESULT	DUPLICATE RESULT	RELATIVE % DIFFERENCE
9011178-08	<0 25 mg/L	<0.25 mg/L	Not calculable

~~Problem~~ ok

3. QUALITY CONTROL SAMPLES

	SAMPLE ID	TRUE VALUE	FOUND VALUE	PERCENT RECOVERY
A	LCS	2 00 mg/L	1 98 mg/L	99 0
B	Blank		<0 25 mg/L	

** CHLORIDE **

$\left(\frac{62.1 - 73.9}{25.1}\right) 100\% =$

1. MATRIX SPIKE

SAMPLE ID	SAMPLE RESULT	SPIKE ADDED	SPIKE RESULT	% RECOVERY
9011176-08(1 1)	73 9 mg/L	25 1 mg/L	62 1 mg/L	100.2

62.7%

(47) mg/L

2. DUPLICATE

SAMPLE ID	SAMPLE RESULT	DUPLICATE RESULT	RELATIVE % DIFFERENCE
9011176-08	73.9 mg/L	74 0 mg/L	0.1

~~24.7~~ ~~75~~

12/68.7

3. QUALITY CONTROL SAMPLES

	SAMPLE ID	TRUE VALUE	FOUND VALUE	PERCENT RECOVERY
A	LCS	52.1 mg/L	50 mg/L	96 0
B	Blank	<5 0 mg/L		

** CARBONATE **

1. DUPLICATE

	SAMPLE ID	SAMPLE RESULT	DUPLICATE RESULT	RELATIVE % DIFFERENCE
A	9011176-01	359 mg/L	358 mg/L	0.3
B	9011176-08	385 mg/L	386 mg/L	0.3

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TMA/NORCAL

2

QUALITY CONTROL SAMPLES

SAMPLE ID	TRUE VALUE	FOUND VALUE	PERCENT RECOVERY
LCS(1)	27 3	25 1 mg/L	91.9
LCS(2)	27 3	24.5 mg/L	89.7

** FLUORIDE **

1

MATRIX SPIKE

$\left(\frac{3-2}{1.1}\right)100\%$

SAMPLE ID	SAMPLE RESULT	SPIKE ADDED	SPIKE RESULT	% RECOVERY
9011176-01	1.1 mg/L	2.0 mg/L	3.0	95 0

OK

2

DUPLICATE

SAMPLE ID	SAMPLE RESULT	DUPLICATE RESULT	RELATIVE % DIFFERENCE
9011176-01	1.1 mg/L	1.0 mg/L	9 5

3

QUALITY CONTROL SAMPLES

SAMPLE ID	TRUE VALUE	FOUND VALUE	PERCENT RECOVERY
LCS(1)	1 0 mg/L	1 1 mg/L	110 0
LCS(2)	1 0 mg/L	1 0 mg/L	100 0
Blank(1)		<1 0 mg/L	
Blank(2)		<1 0 mg/L	

** SULFATE **

1

$\left(\frac{75.5-40}{37.1}\right)(100\%) = 95.7$

MATRIX SPIKE

SAMPLE ID	SAMPLE RESULT	SPIKE ADDED	SPIKE RESULT	% RECOVERY
9011176-08	37 1 mg/L	40 mg/L	75 5 mg/L	96 0

OK

2

DUPLICATE

SAMPLE ID	SAMPLE RESULT	DUPLICATE RESULT	RELATIVE % DIFFERENCE
9011176-08	37 1 mg/L	36 6 mg/L	1 4

3

QUALITY CONTROL SAMPLES

SAMPLE ID	TRUE VALUE	FOUND VALUE	PERCENT RECOVERY
LCS	20 0 mg/L	17 0 mg/L	85 0
Blank		15 0 mg/L	

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** SPECIFIC CONDUCTIVITY **

1 DUPLICATE

SAMPLE ID	SAMPLE RESULT	DUPLICATE RESULT	RELATIVE % DIFFERENCE
9011176-08	780	780	0

2 QUALITY CONTROL SAMPLES

SAMPLE ID	TRUE VALUE	FOUND VALUE	PERCENT RECOVERY
LCS	267	252	94 4

** TOTAL SUSPENDED SOLIDS **

1 DUPLICATE

SAMPLE ID	SAMPLE RESULT	DUPLICATE RESULT	RELATIVE % DIFFERENCE
9011176-09	<3 3 mg/L	<3 3 mg/L	Not calculable

2 QUALITY CONTROL SAMPLES

SAMPLE ID	TRUE VALUE	FOUND VALUE	PERCENT RECOVERY
LCS	32 1 mg/L	28 0 mg/L	87.2

** TOTAL DISSOLVED SOLIDS **

1 DUPLICATE

SAMPLE ID	SAMPLE RESULT	DUPLICATE RESULT	RELATIVE % DIFFERENCE
9011176-09	505 mg/L	520 mg/L	2.9

2 QUALITY CONTROL SAMPLES

SAMPLE ID	TRUE VALUE	FOUND VALUE	PERCENT RECOVERY
LCS	414 mg/L	435 mg/L	105.1

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TEST CODE CL W NAME Chloride - Aqueous

Standard Methods for Chemical Analysis of Water and Wastes
EPA - 600/4-79-020, March 1979, Method 325 2

TEST CODE CO3 W NAME CARBONATE

Standard Methods for the Examination of Water and Wastewater (16th Edition, 1985), Method 403

TEST CODE F W NAME Fluoride - Aqueous

Method for Chemical Analysis of Water and Wastes EPA-600/4-79-020, March 1983
Method 340 2

TEST CODE NO3NO2 NAME Nitrate Plus Nitrite

Methods for Chemical Analysis of Water and Wastes
EPA - 600/4-79-020 March 1979 Method 353 1

TEST CODE PH W NAME pH - Aqueous

Standard Methods for the Examination of Water and Wastewater,
(16th Edition, 1985), Method 423

TEST CODE SO4 W NAME Sulfate - Aqueous

Standard Methods for the Examination of Water and Wastewater
(16th Edition) Method 426C.

TEST CODE S COND NAME Specific Conductance

Standard Methods for the Examination of Water and Wastewater,
(16th Edition, 1985), Method 205

TEST CODE TAL M NAME TAL Metals - CLP Protocol

Metals - EPA Target Analyte List Metals - CLP Protocol SOW788

TEST CODE TDS NAME Total Dissolved Solids

Standard Methods for the Examination of Water and Wastewater,
(16th Edition, 1985) Method 209B

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1-800-4 LAB TEST FAX (617) 890-3883

Received: 11/15/90 Test Methodology

TEST CODE TSS NAME Total Suspended Solids

Standard Methods for the Examination of Water and Wastewater (16th Edition, 1985), Method 209C

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Spike 1ml sample + 1ml 3.1 ppm = 1.55 ppm

SKINNER & SHERMAN LABORATORIES

TRAACS 800 SYSTEM BENCH SHEET
GENERAL ANALYSIS

DATE: 11/30/90
ANALYST: WEGGHAM
METHOD:
NO_3/NO_2

RUN ID'S		WORKORDER
90334	- 03	9011176
	- 04	9011031
	-	
	-	
	-	
	-	

STANDARDS:	NAME	SOURCE	PREPARED
ICV	WP907		
CCV	1.24 PPM		
ICB/CCB			

Rel Abs 0.9000 NO_3
NO_2

POS	LAB ID	SAMPLE ID	COMMENTS
01	Prime		
02	0.62 PPM		
03	1.24		
04	2.48		
05	3.1		
06	3.1		
07	0.62		
08	0.62		
09	ICV		
10	ICB		
11	Pb		
12	9011176-01		
13		~~01~~ 02	
14		~~015~~ 03	
15		~~02~~ 04	
16		~~03~~ 05	
17		~~04~~ 06	
18		~~05~~ 07	
19		~~06~~ 08	
20		~~07~~ 08D	
21	CCV		
22	CCB		
23		085	
24		09	
25		10	
26		11	
27		12	
28	9011031-01		
29		-02	
30		-03	
31		-04	
32		BLANK	
33	CCV		
34	CCB		
35		05	

90

TO 0000

SKINNER & SHERMAN LAB
TRAACS BENCH SHEET
DATE: 11/20/90

RUN ID: 90334

POS	LAB ID	SAMPLE ID	COMMENTS
36	06 (10X)		
37	07		
38	08		
39	9011176-01 STT		
40	BLANK		
41	BLANK		
42	BLANK		
43	9011051-06 STT		
44	BLANK		
45	CCV		
46	CCB		
47	BLANK		
48	BLANK		
49	BLANK		
50	WP987		
51	BLANK		
52	BLANK		
53	BLANK		
54	~~CCV~~ 9011176-05 STT		
55	~~CCB~~ -10 STT		
56	BLANK		
57	CCV		
58	CCB		
59			
60			
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63			
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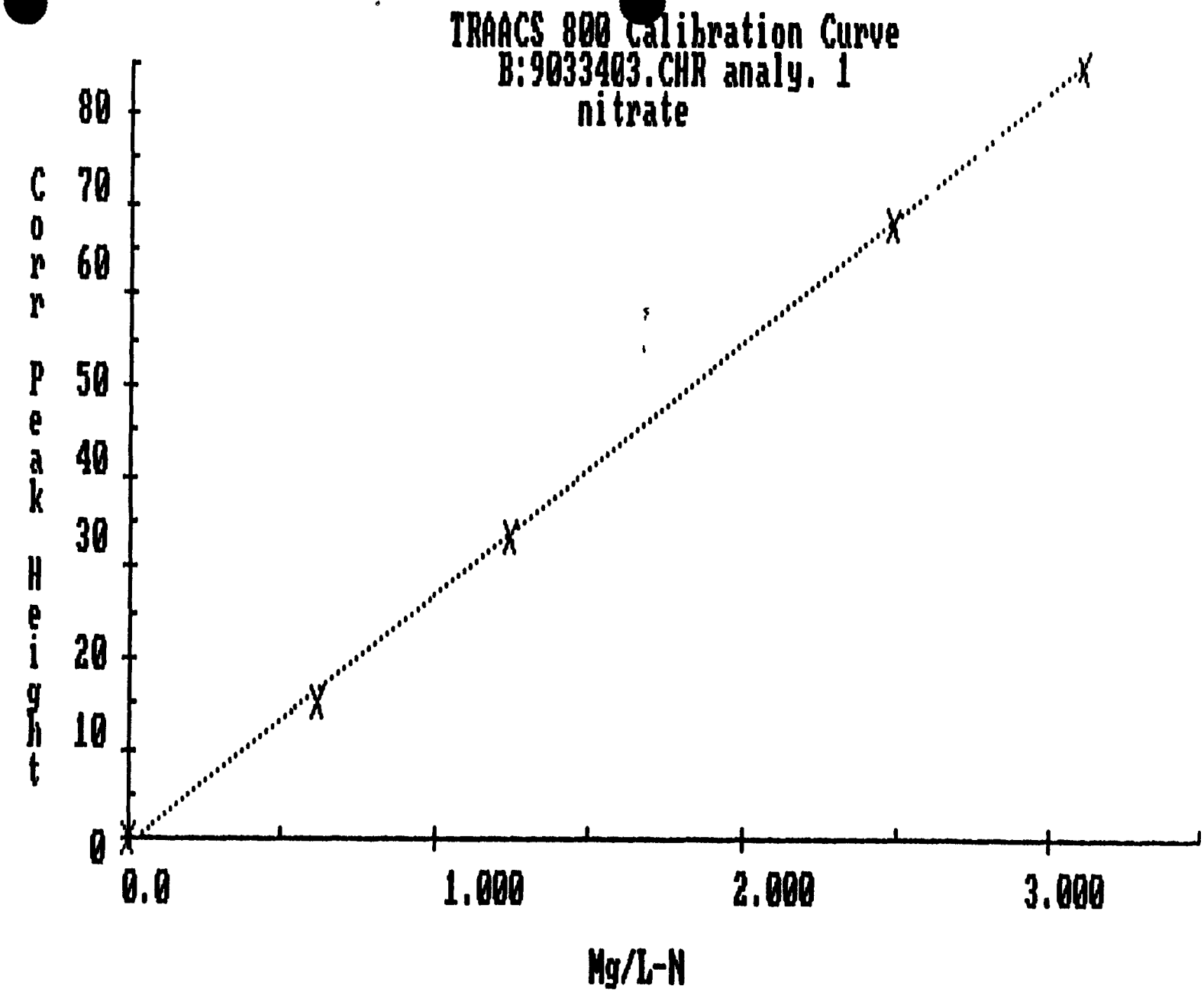
85			


TRAACS 800 Calibration Curve
B:9033403.CHR analy. 1
nitrate
Corr Peak Height
80
70
60
50
40
30
20
10
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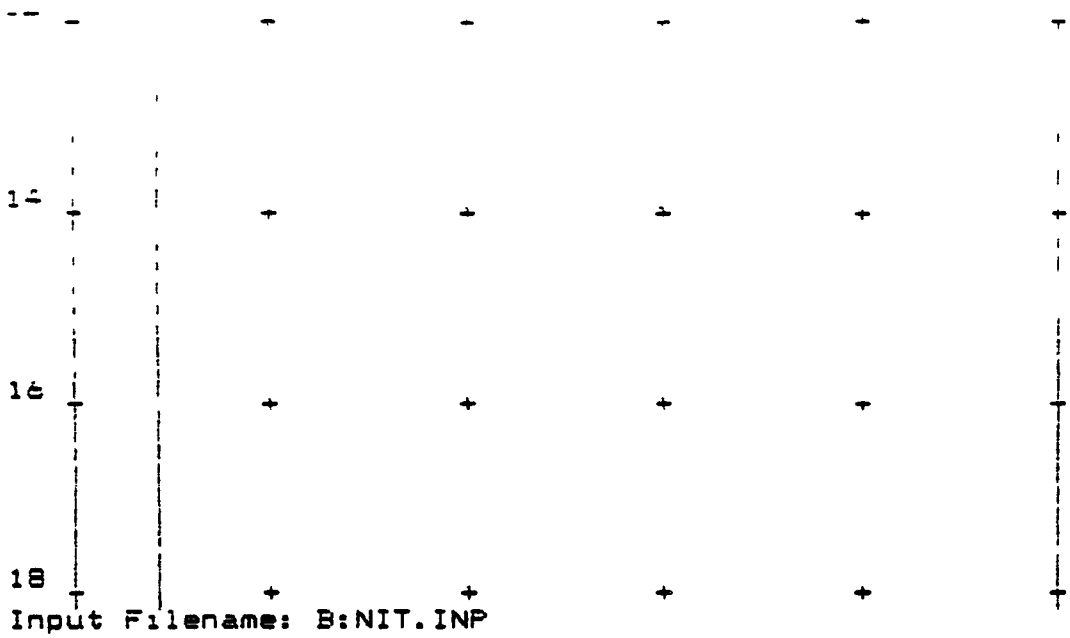
0.0
1.000
2.000
3.000
Mg/L-N

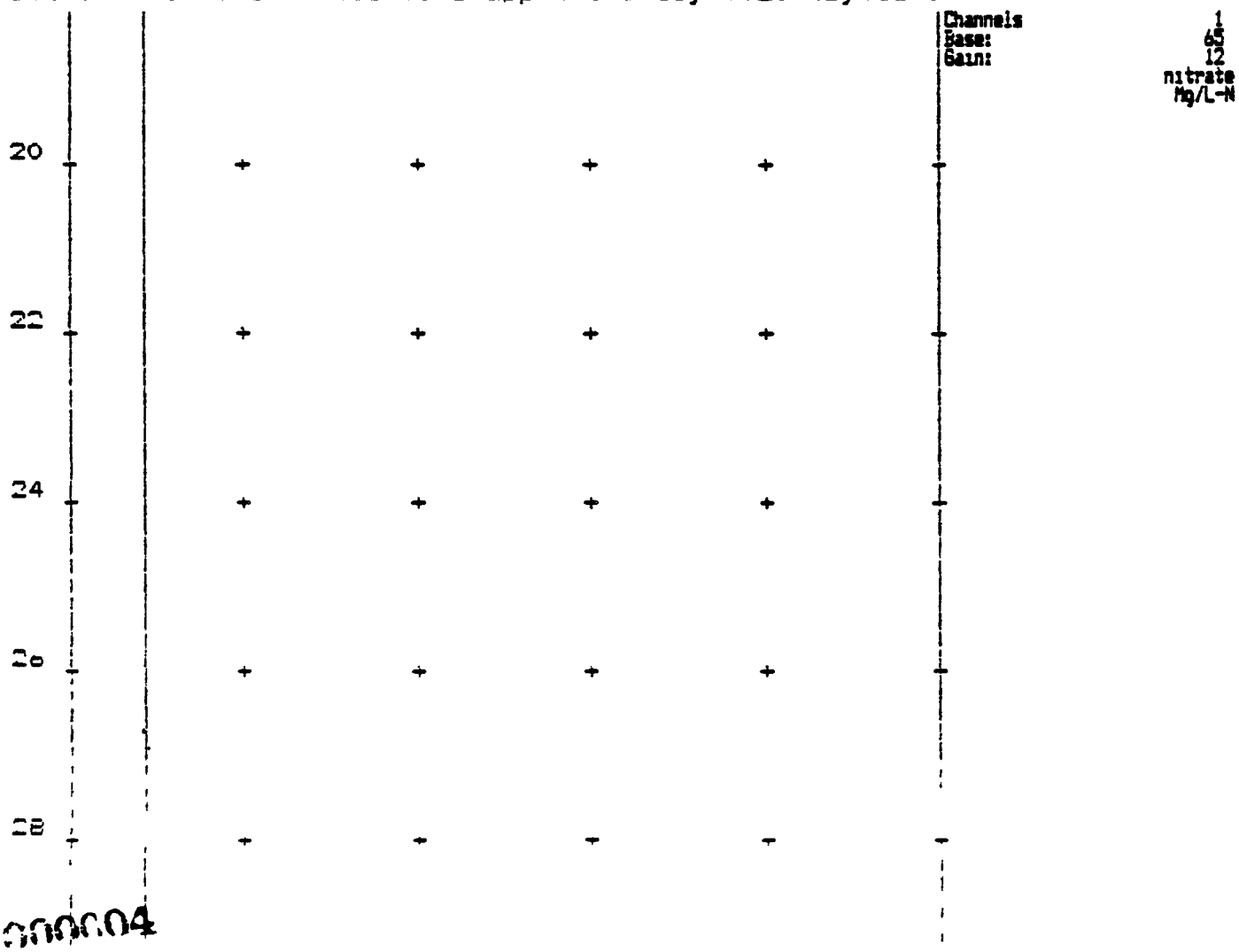
000003



Input Filename: B:NIT.INP
Time: 21:51; Date: 11-30-90
Operator: NEEDHAM

Comment: commercial nitrate with four calibrants

There are 14630912 (bytes) free on disk.
File B:9033403.CHR will take approximately 9920 (bytes).



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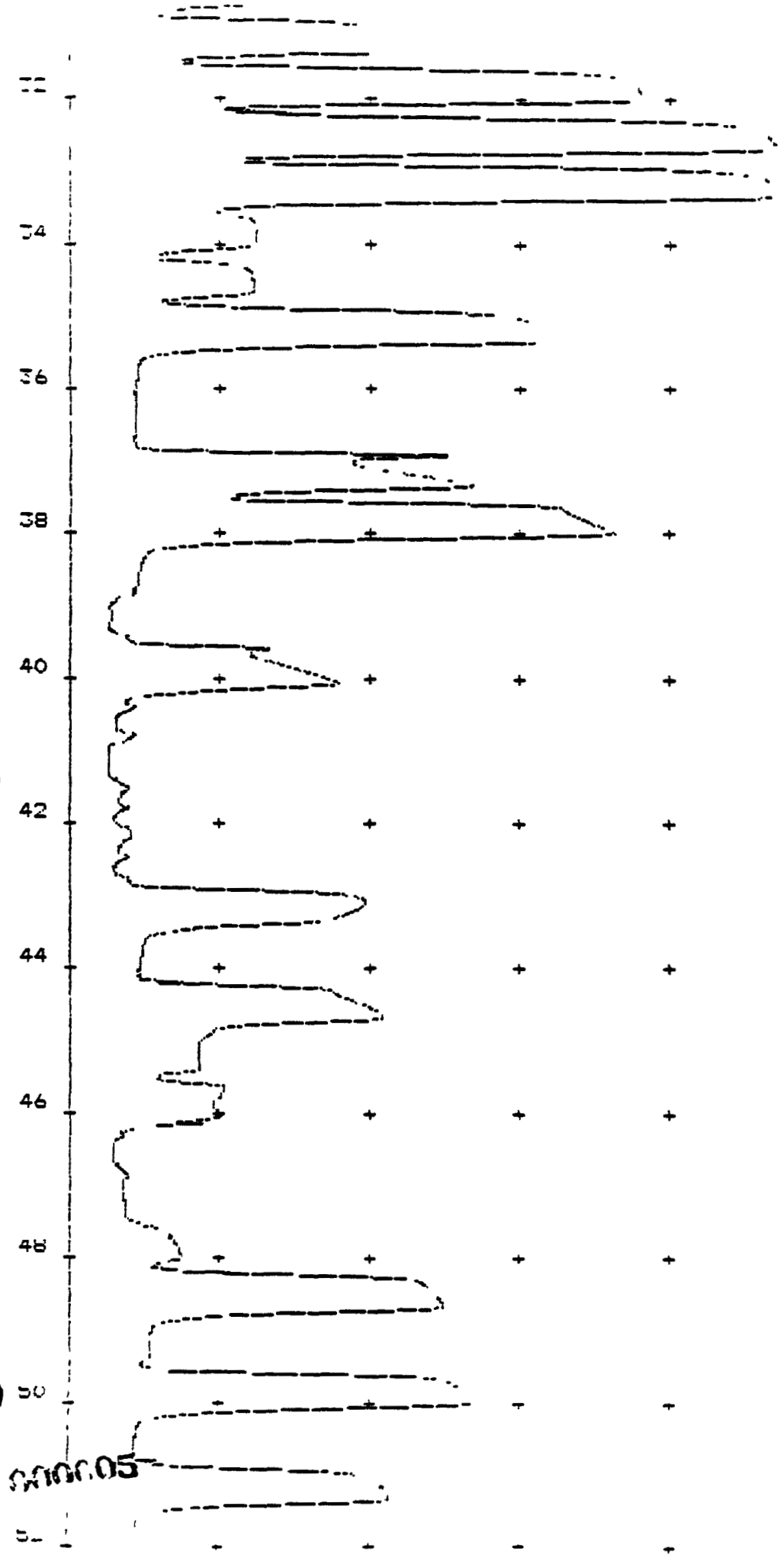
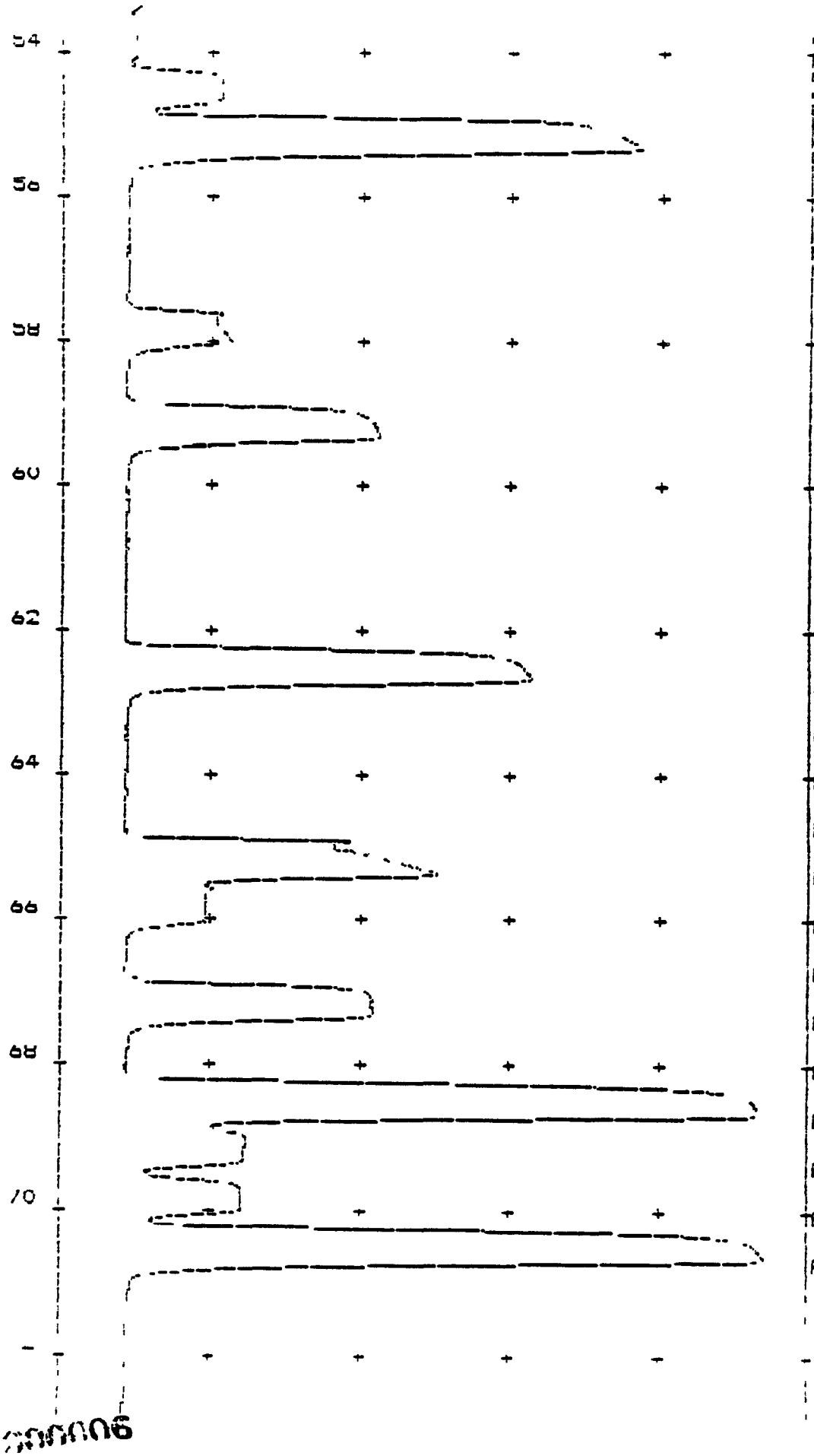


PK	4	CP	4	tvp	C
PK	5	CP	5	tvp	C	0.110
PK	6	CP	6	tvp	M	0.116
PK	7	CP	7	tvp	L	0.6045
PK	8	CP	8	tvp	L	0.5903
PK	9	CP	9	typ	S	1.976
PK	10	CP	10	typ	S	0.03362 M
PK	11	CP	11	typ	S	0.02655 M
PK	12	CP	12	typ	S	1.656 P
PK	13	CP	13	typ	S	2.344 N
PK	14	CP	14	typ	S	0.04334 M
PK	15	CP	15	typ	S	-0.09540 M
PK	16	CP	16	typ	S	1.006 N
PK	17	CP	17	typ	S	-0.07066 M
PK	18	CP	18	typ	S	-0.09893 M
PK	19	CP	19	typ	S	-0.07242 M
PK	20	CP	20	typ	S	-0.07154 M
PK	21	CP	21	typ	S	1.134 S
PK	22	CP	22	typ	S	0.05483 M
PK	23	CP	23	typ	S	1.223 N
PK	24	CP	24	typ	S	0.3323
PK	25	CP	25	typ	S	0.4437
PK	26	CP	26	typ	S	-0.07242 M
PK	27	CP	27	typ	S	-0.02294 M
PK	28	CP	28	typ	S	0.2484
PK	29	CP	29	tvp	S	1.508
PK	30	CP	30	tvp	S	0.09725 M
PK	31	CP	31	typ	S	1.002
PK	32	CP	32	tvp	S	0.03185 M
PK	33	CP	33	tvp	S	1.231
PK	34	CP	34	tvp	S	[illegible]

0000.05



PK	36	CP	36	typ	S	[illegible]
PK	37	CP	37	typ	S	0.07304 M
PK	38	CP	38	typ	S	0.4737
PK	39	CP	39	typ	S	2.319
PK	40	CP	40	typ	S	0.03185 M
PK	41	CP	41	typ	S	0.02653 M
PK	42	CP	42	typ	S	0.02390 M
PK	43	CP	43	typ	S	0.5170
PK	44	CP	44	typ	S	0.02213 M
PK	45	CP	45	typ	S	1.239
PK	46	CP	46	typ	S	0.02832 M
PK	47	CP	47	typ	S	0.02302 M
PK	48	CP	48	typ	S	0.02213 M
PK	49	CP	49	typ	S	0.02302 M
PK	50	CP	50	typ	S	1.976
PK	51	CP	51	typ	S	0.02832 M
PK	52	CP	52	typ	S	0.02302 M
PK	53	CP	53	typ	S	0.02125 M
PK	54	CP	54	typ	S	1.525 N
PK	55	CP	55	typ	S	0.4048
PK	56	CP	56	typ	S	0.02567 M
PK	57	CP	57	typ	S	1.213
PK	58	CP	58	typ	S	0.03185 M
PK	59	CP	59	typ	H	3.096
PK	60	CP	60	typ	L	0.6036
PK	61	CP	61	typ	L	0.5868
PK	62	CP	62	typ	G	3.110

Last Base

Time: [illegible]

Channels 1
Base: 65
Gain: 12

nitrate
Mg/L-N

Base drift correction made
Larryover correction made
Gain drift correction made

	Init base				351		
PK	1	CP	1	typ	P	3.096	Primer
	Rel Abs					0.90	
PK	2	CP	2	typ	C	0.5842	0.62 ppm
PK	3	CP	3	typ	C	1.245	1.24
PK	4	CP	4	typ	C	2.477	2.48
PK	5	CP	5	typ	C	3.107	3.1
PK	6	CP	6	typ	H	3.109	3.1
PK	7	CP	7	typ	L	0.5927	0.62
PK	8	CP	8	typ	L	0.5936	0.62
PK	9	CP	9	typ	S	1.982	ICV/LCS 2 ppm (99.1 %)
PK	10	CP	10	typ	S	0.02755	M ICB
PK	11	CP	11	typ	S	0.03213	M PB
PK	12	CP	12	typ	S	1.664	P 9011176-01
PK	13	CP	13	typ	S	2.344	N 02
PK	14	CP	14	typ	S	0.03502	M 03
PK	15	CP	15	typ	S	-0.09012	M 04
PK	16	CP	16	typ	S	1.013	N 05
PK	17	CP	17	typ	S	-0.07114	M 06
PK	18	CP	18	typ	S	-0.09300	M 07
PK	19	CP	19	typ	S	-0.06629	M 08
PK	20	CP	20	typ	S	-0.06558	M 08D
PK	21	CP	21	typ	S	1.141	S CCV 1.24 ppm (92.0 %)
PK	22	CP	22	typ	S	0.05368	M CCB
PK	23	CP	23	typ	S	1.230	N 08S
PK	24	CP	24	typ	S	0.3309	09
PK	25	CP	25	typ	S	0.4477	10
PK	26	CP	26	typ	S	-0.06962	M 11
PK	27	CP	27	typ	S	-0.01699	M 12
PK	28	CP	28	typ	S	0.2542	9011031-01
PK	29	CP	29	typ	S	1.513	02
PK	30	CP	30	typ	S	0.09377	M 03
PK	31	CP	31	typ	S	1.668	04
PK	32	CP	32	typ	S	0.02737	M Blank
PK	33	CP	33	typ	S	1.257	CCV (101.4 %)
PK	34	CP	34	typ	S	0.03157	M CCB
PK	35	CP	35	typ	S	0.2449	05
PK	36	CP	36	typ	S	0.09598	M 06 10x =
PK	37	CP	37	typ	S	0.08093	M 07
PK	38	CP	38	typ	S	0.4789	08
PK	39	CP	39	typ	S	2.523	9011176-01 Str
PK	40	CP	40	typ	S	0.02211	M Blank
PK	41	CP	41	typ	S	0.03173	M Blank
PK	42	CP	42	typ	S	0.02909	M Blank
PK	43	CP	43	typ	S	0.5223	9011031-06 Str
PK	44	CP	44	typ	S	0.02435	M Blank
PK	45	CP	45	typ	S	1.244	CCV (100.3 %)
PK	46	CP	46	typ	S	0.02618	M CCB
PK	47	CP	47	typ	S	0.02817	M Blank
PK	48	CP	48	typ	S	0.02726	M Blank
PK	49	CP	49	typ	S	0.02514	M Blank
PK	50	CP	50	typ	S	1.[illegible]	W0987 (99.1 %)
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	Blank
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	Blank

Sample of 05, 10 had erratic peaks, so ran them again later in run
Positions #'s 39, 54, 55 respectively

1.230 ÷ 1.55 = 99.4 % spike recovery

PK	54	CP	54	typ	S	1.[illegible]	N	9011176-05 STI
PK	55	CP	55	typ	S	0.4007		-10 ST
PK	56	CP	56	typ	S	0.02840	M	BLANK
PK	57	CP	57	typ	S	1.218		Cu1 (98.2 %)
PK	58	CP	58	typ	S	0.02971	M	Cu3
PK	59	CP	59	typ	H	3.100		
PK	60	CP	60	typ	L	0.5898		
PK	61	CP	61	typ	L	0.5879		
PK	62	CP	62	typ	G	3.109		
Last base						352		

Sample statistics

Anal	level	cups	avg	std dev	cv
1	all	50	0.5069	0.738	146%

Anal 1: linear fit
Carryover factor: 0.60%.

Chart saved to file B:9033403.CHR.

text file B:9033403.TXT has been saved to disk.

Spike 1ml sample + 1ml 50 ppm = 25 ppm

SKINNER & SHERMAN LABORATORIES

TRAACS 800 SYSTEM BENCH SHEET
GENERAL ANALYSIS

DATE: 12/3/90
ANALYST: Nakham
METHOD:

Chloride 325.2

RUN ID'S		WORKORDER
50337	- 01	9011133
	-	9011178
	-	9011176
	-	9011227
	-	9011201
	-	9011262

STANDARDS:	NAME	SOURCE	PREPARED
ICV	ILP987	(52.1 PPM TRUE VALUE)	9011280 9011288
CCV	50 ppm		9011263
ICB/CCB			

Relabs 0.7400

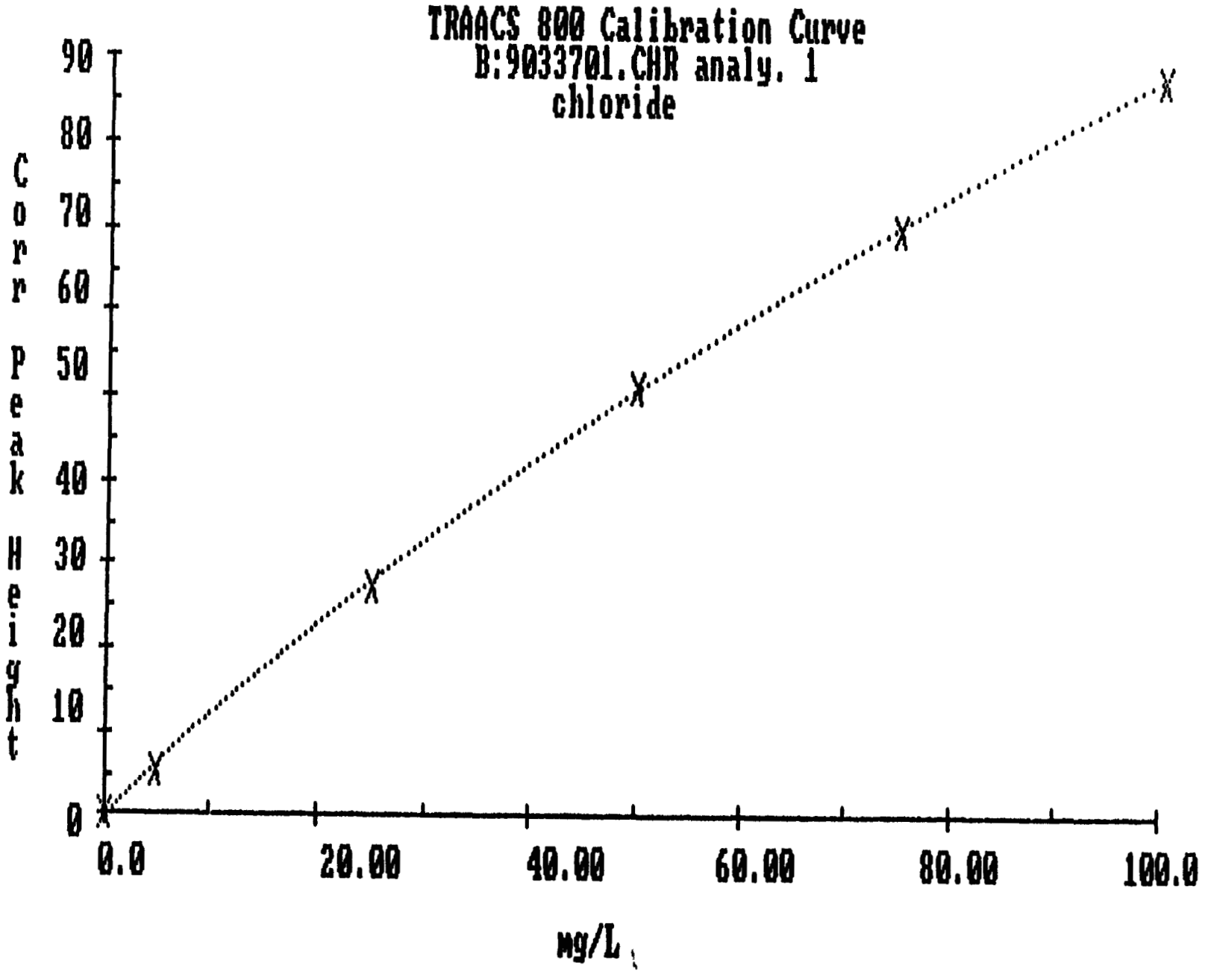
POS	LAB ID	SAMPLE ID	COMMENTS
01	Blnk		
02	5 ppm		
03	25		
04	50		
05	75		
06	100		
07	100		
08	5		
09	5		
10	ICV/LCS		
11	ICB		
12	Pb		
13	9011133-01		
14	02		
15	9011178-01		
16	02		
17	03		
18	04		
19	05		
20	9011176-01		
21	02		
22	CCV		
23	CCB		
24	~~02~~ 03		
25	04		
26	05		
27	06		
28	07		
29	08		
30	08D		
31	08S		
32	09		
33	10		
34	CCV		
35	CCB		

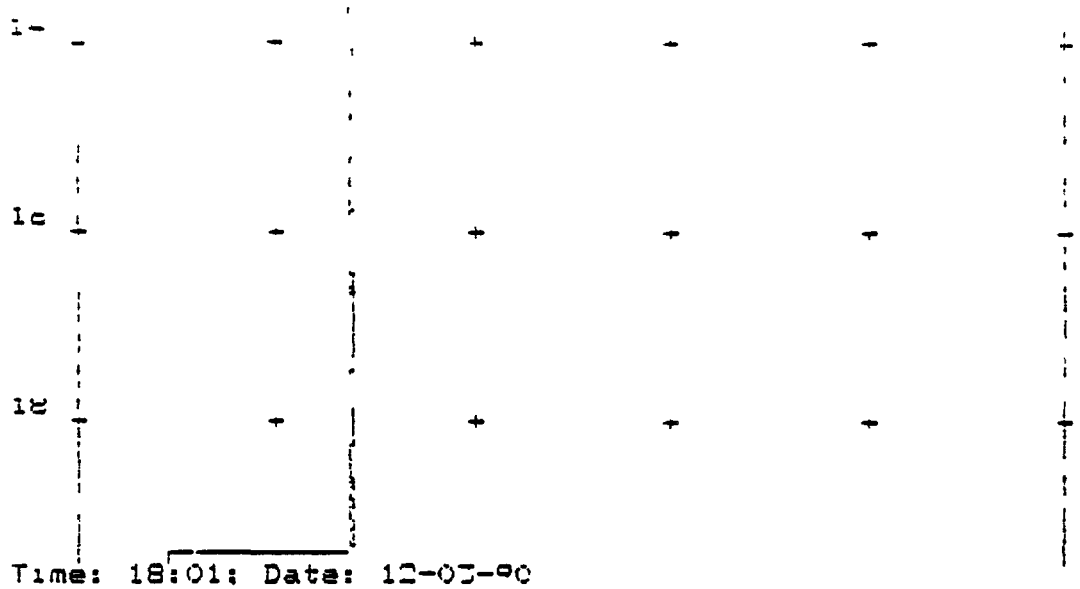
000009

SKINNER & SHERMAN LAB
TRAACS BENCH SHEET
DATE: 12/3/90

RUN ID: 90337

POS	LAB ID	SAMPLE ID	COMMENTS
36	11		
37	12		
38	9011277-01		
39	02		
40	03		
41	9011201-06	5x	
42	9011262-01		
43	02		
44	03		
45	04		
46	CW		
47	CW3		
48	05		
49	06		
50	07		
51	08		
52	9011280-01		
53	02		
54	03		
55	04		
56	05		
57	9011283-01		
58	CW		
59	CW3		
60	02		
61	03		
62	04		
63	05		
64	9011263-01		
65	01D		
66	01S		
67	~~01 10X~~	9011201-06	50X
68	~~01D 10X~~		100X
69	~~01S 10X~~	9011262-01	STC
70	CW		
71	CW3		
72	BLANK		
73	BLANK		
74	BLANK		
75	BLANK		
76	BLANK		
77	BLANK		
78	BLANK		
79	BLANK		
80	BLANK		
81	9011201-06	500X	
82	CW		
83	CW3		
84			
85			

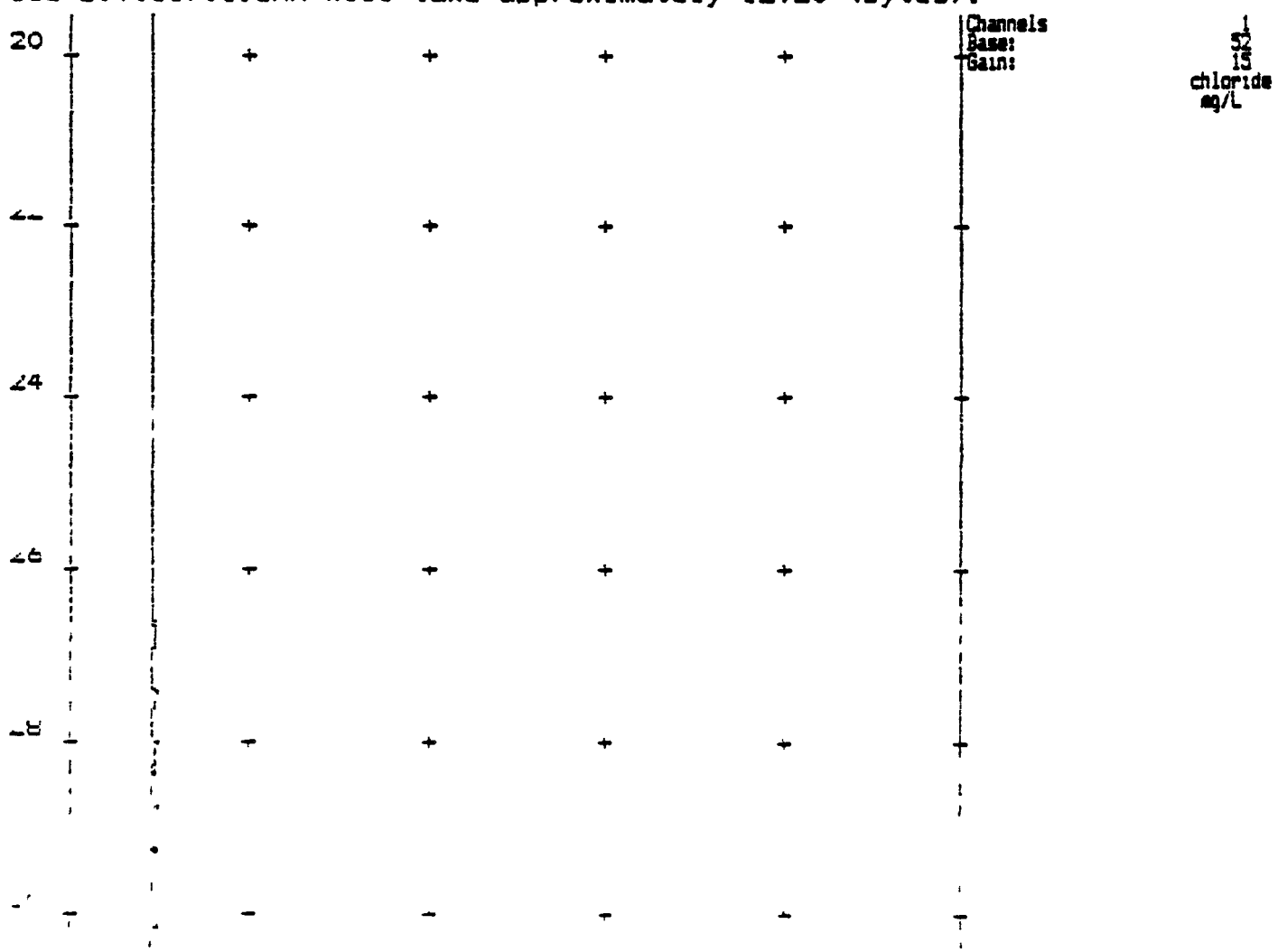

TRAACS 800 Calibration Curve
B:9033701.CHR analy. 1
chloride
Corr Peak Height
90
80
70
60
50
40
30
20
10
0
0.0
20.00
40.00
60.00
80.00
100.0
mg/L

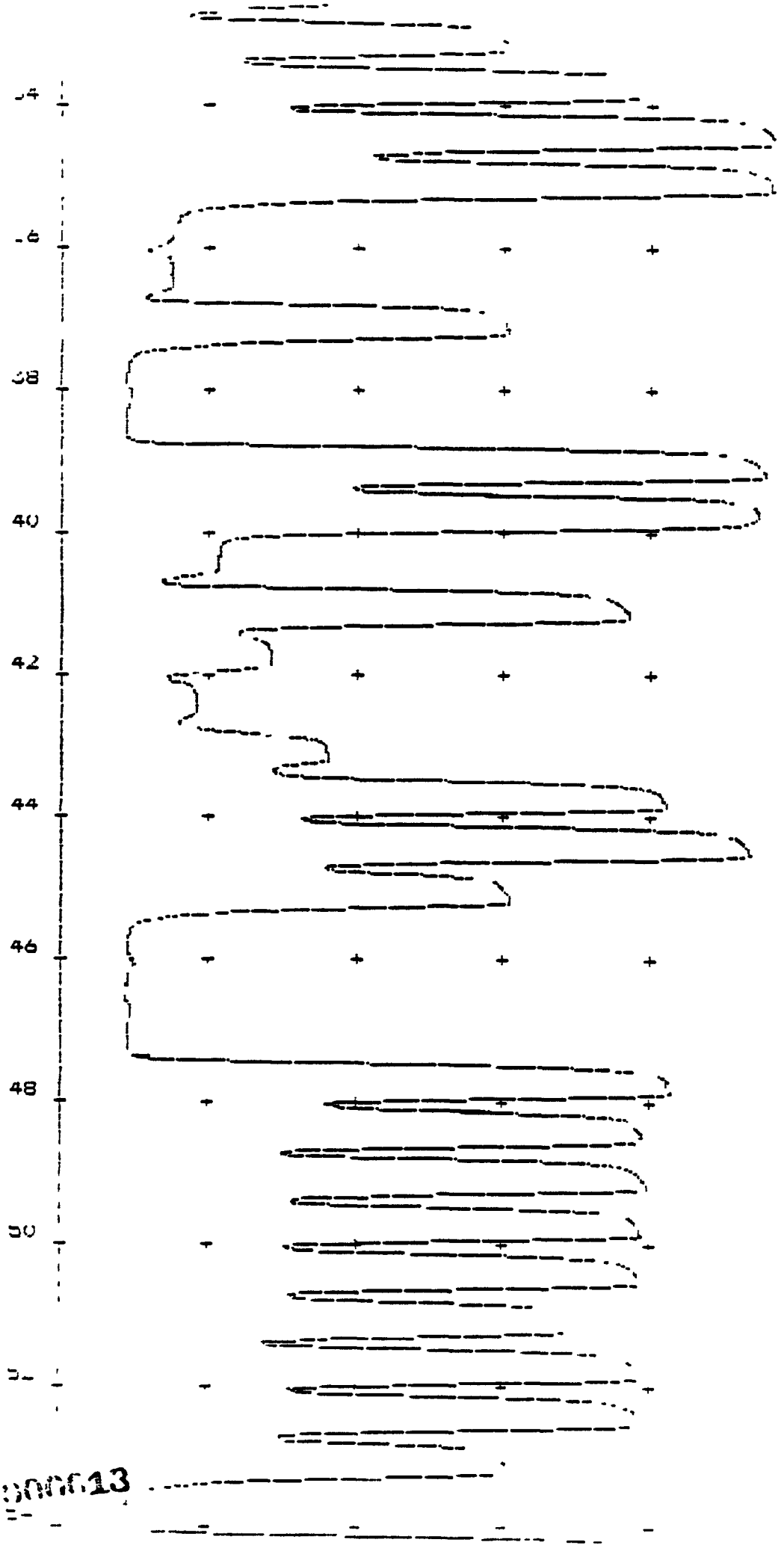


Time: 18:01: Date: 12-03-90
Operator: NEEDHAM

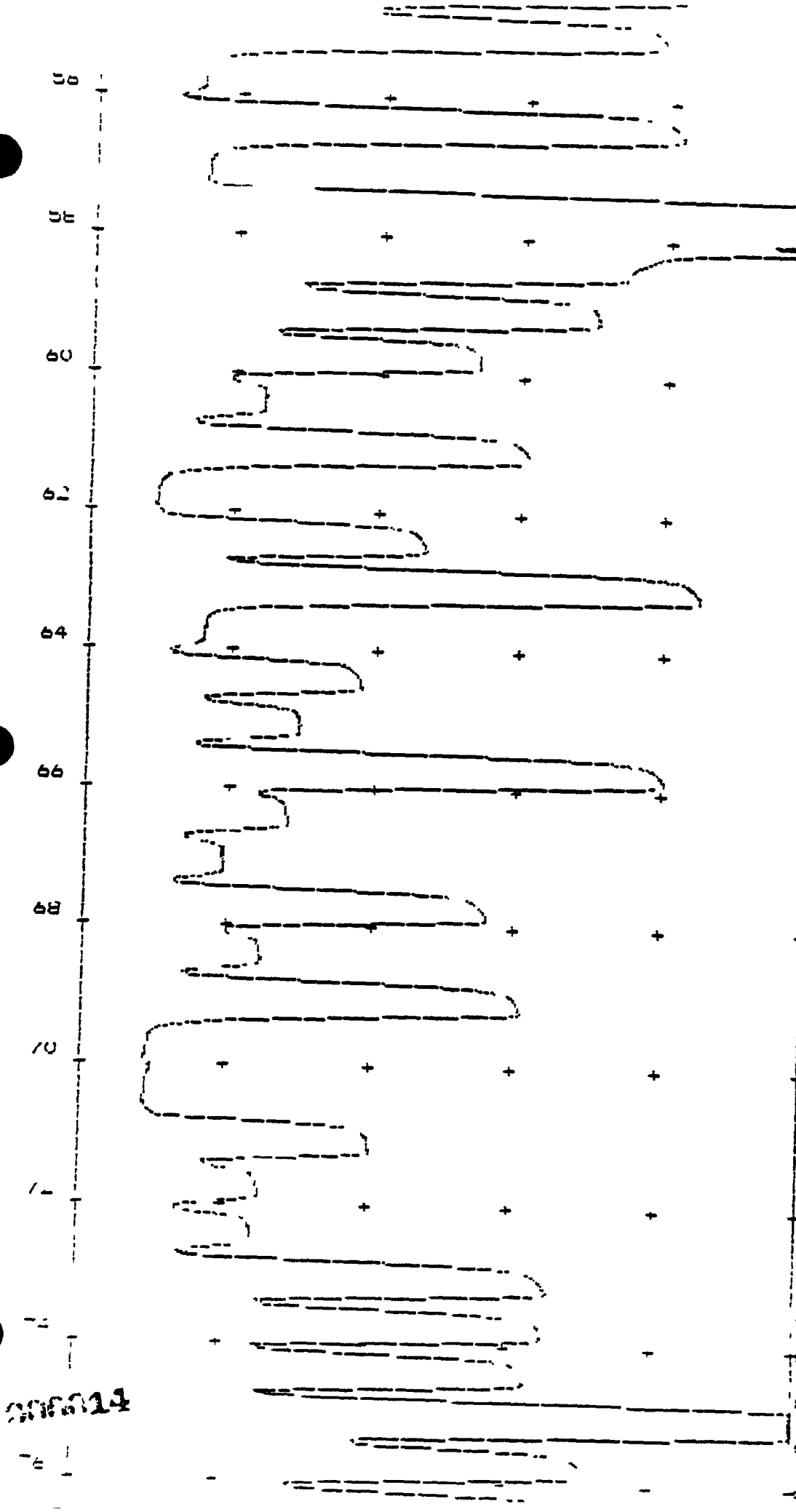
Comment: commercial chloride with five calibrants

There are 14581760 (bytes) free on disk.
File B:9033701.CHR will take approximately 12920 (bytes).

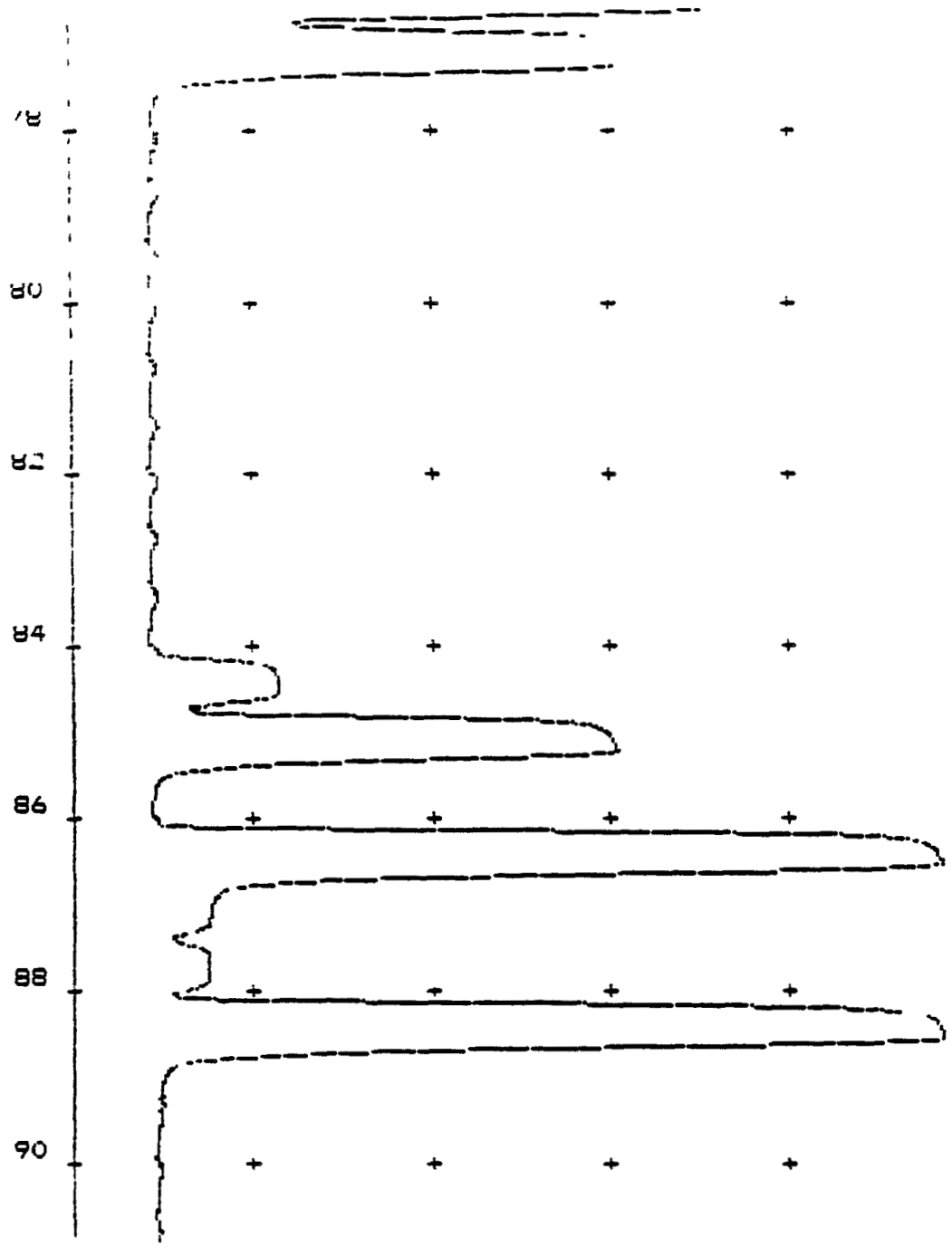




PK	3 CP	3 typ S		
PK	4 CP	4 typ S		
PK	5 CP	5 typ S		
PK	6 CP	6 typ S		99.82
PK	7 CP	7 typ M		99.49
PK	8 CP	8 typ L		4.927
PK	9 CP	9 typ L		4.828
PK	10 CP	10 typ S		50.82
PK	11 CP	11 typ S		0.07050 M
PK	12 CP	12 typ S		-0.07840 M
PK	13 CP	13 typ S		98.39
PK	14 CP	14 typ S		96.92
PK	15 CP	15 typ S		9.980
PK	16 CP	16 typ S		71.90
PK	17 CP	17 typ S		16.44
PK	18 CP	18 typ S		7.559
PK	19 CP	19 typ S		24.05
PK	20 CP	20 typ S		79.18
PK	21 CP	21 typ S		95.07
PK	22 CP	22 typ S		51.23
PK	23 CP	23 typ S		0.2197 M
PK	24 CP	24 typ S		0.01463 M
PK	25 CP	25 typ S		0.1824 M
PK	26 CP	26 typ S		79.79
PK	27 CP	27 typ S		74.38
PK	28 CP	28 typ S		75.48
PK	29 CP	29 typ S		74.34
PK	30 CP	30 typ S		74.44
PK	31 CP	31 typ S		[illegible]
PK	32 CP	32 typ S		74.48
PK	33 CP	33 typ S		74.38
PK	34 CP	34 typ S		[illegible]
PK	35 CP	35 typ S		[illegible]



PK	38	CP	38	typ	S	4.370
PK	39	CP	39	typ	S	77.59
PK	40	CP	40	typ	S	5.247 N
PK	41	CP	41	typ	S	104.9 D
PK	42	CP	42	typ	S	67.93
PK	43	CP	43	typ	S	62.75
PK	44	CP	44	typ	S	42.96
PK	45	CP	45	typ	S	12.47
PK	46	CP	46	typ	S	51.26
PK	47	CP	47	typ	S	0.3693 M
PK	48	CP	48	typ	S	34.92
PK	49	CP	49	typ	S	82.73
PK	50	CP	50	typ	S	5.728
PK	51	CP	51	typ	S	25.77 N
PK	52	CP	52	typ	S	17.52
PK	53	CP	53	typ	S	76.55
PK	54	CP	54	typ	S	16.17
PK	55	CP	55	typ	S	8.365
PK	56	CP	56	typ	S	45.47
PK	57	CP	57	typ	S	13.06
PK	58	CP	58	typ	S	51.32
PK	59	CP	59	typ	S	0.1824 M
PK	60	CP	60	typ	S	0.07050 M
PK	61	CP	61	typ	S	28.16
PK	62	CP	62	typ	S	13.41
PK	63	CP	63	typ	S	12.77
PK	64	CP	64	typ	S	56.91
PK	65	CP	65	typ	S	56.37
PK	66	CP	66	typ	S	53.36
PK	67	CP	67	typ	S	104.9 D



PK	69	CP	69	typ S	[illegible]
PK	70	CP	70	typ S	51.46
PK	71	CP	71	typ S	0.2758 M
PK	72	CP	72	typ S	0.07050 M
PK	73	CP	73	typ S	-0.00399 M
PK	74	CP	74	typ S	-0.1527 M
PK	75	CP	75	typ S	-0.07840 M
PK	76	CP	76	typ S	-0.07840 M
PK	77	CP	77	typ S	-0.1156 M
PK	78	CP	78	typ S	-0.09699 M
PK	79	CP	79	typ S	-0.1156 M
PK	80	CP	80	typ S	-0.1527 M
PK	81	CP	81	typ S	11.52
PK	82	CP	82	typ S	50.99
PK	83	CP	83	typ S	0.07050 M
PK	84	CP	84	typ H	100.7
PK	85	CP	85	typ L	4.967
PK	86	CP	86	typ L	4.768
PK	87	CP	87	typ G	100.9
Last base					391

Time: 18:01: Date: 12-03-90
Operator: NEEDHAM

Comment: commercial chloride with five calibrants

Channels 1
Base: 52
Gain: 15

chloride
mg/L

Base drift correction made
Carryover correction made
Gain drift correction made

[illegible] Base 377
Pk 1 CP 1 typ F 99.76 Primer
Rel Abs 0.74
Pk [illegible] 5ppm
[illegible] 25

PK	5	CP	5	typ	C	75.1	50 75
PK	6	CP	6	typ	C	99.82	100
PK	7	CP	7	typ	H	99.42	100
PK	8	CP	8	typ	L	4.815	5
PK	9	CP	9	typ	L	4.844	5
PK	10	CP	10	typ	S	50.80	CCl4 52.1 (97.5%)
PK	11	CP	11	typ	S	0.02964	M TCO
PK	12	CP	12	typ	S	-0.04305	M Pb
PK	13	CP	13	typ	S	98.45	9011133-01
PK	14	CP	14	typ	S	96.70	-02
PK	15	CP	15	typ	S	9.817	9011176-01
PK	16	CP	16	typ	S	71.82	02
PK	17	CP	17	typ	S	16.27	03
PK	18	CP	18	typ	S	7.508	04
PK	19	CP	19	typ	S	23.96	05
PK	20	CP	20	typ	S	78.99	9011176-01
PK	21	CP	21	typ	S	94.74	02
PK	22	CP	22	typ	S	50.89	CCl4 50ppm (101.8%)
PK	23	CP	23	typ	S	0.1432	M CCl3
PK	24	CP	24	typ	S	0.01522	M 03
PK	25	CP	25	typ	S	0.1795	M 04
PK	26	CP	26	typ	S	79.58	05
PK	27	CP	27	typ	S	73.95	06
PK	28	CP	28	typ	S	75.04	07
PK	29	CP	29	typ	S	73.90	08
PK	30	CP	30	typ	S	73.98	08D
PK	31	CP	31	typ	S	62.05	08S 73.9/2 = 36.95 62.05-36.95 = 25.1 ÷ 25 = 100.4 % Spike Re
PK	32	CP	32	typ	S	74.01	09
PK	33	CP	33	typ	S	73.87	10
PK	34	CP	34	typ	S	51.07	CCl4 (102.1%)
PK	35	CP	35	typ	S	0.1272	M CCl3
PK	36	CP	36	typ	S	77.65	11
PK	37	CP	37	typ	S	73.37	12
PK	38	CP	38	typ	S	4.381	9011277-01
PK	39	CP	39	typ	S	77.15	-02
PK	40	CP	40	typ	S	5.040	N -03
PK	41	CP	41	typ	S	104.4	D 9011201-06 5x=
PK	42	CP	42	typ	S	67.25	9011262-01
PK	43	CP	43	typ	S	62.15	02
PK	44	CP	44	typ	S	42.46	03
PK	45	CP	45	typ	S	12.22	04
PK	46	CP	46	typ	S	50.80	CCl4 (101.6 %)
PK	47	CP	47	typ	S	0.2228	M CCl3
PK	48	CP	48	typ	S	34.58	05
PK	49	CP	49	typ	S	82.01	06
PK	50	CP	50	typ	S	5.474	07
PK	51	CP	51	typ	S	25.45	N 08
PK	52	CP	52	typ	S	17.22	9011280-01
PK	53	CP	53	typ	S	75.84	02
PK	54	CP	54	typ	S	15.80	03
PK	55	CP	55	typ	S	8.158	04
PK	56	CP	56	typ	S	44.95	05
PK	57	CP	57	typ	S	12.74	9011288-01
PK	58	CP	58	typ	S	50.72	CCl4 (101.4 %)
PK	59	CP	59	typ	S	0.00411	M CCl3
PK	60	CP	60	typ	S	-0.03093	M 02
PK	61	CP	61	typ	S	27.75	03
PK	62	CP	62	typ	S	13.09	04
PK	63	CP	63	typ	S	12.49	05
PK	64	CP	64	typ	S	56.20	9011263-01
PK	65	CP	65	typ	S	55.34	01D
PK	66	CP	66	typ	S	52.55	01S 56.2/2 = 28.1 52.55-28.1 = 24.45 ÷ 25 = 97.8% Spike Recovery
PK	67	CP	67	typ	S	103.7	D 9011201-06 50x=
PK	68	CP	68	typ	S	62.86	~~100x=~~ -06 (100x) = 6286.0
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	9011262-01 STD

[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	50.61 CCW (101.2%)
PK	71	CP	71	typ	S	0.06215	M CCW
PK	72	CP	72	typ	S	-0.06480	M Blank
PK	73	CP	73	typ	S	-0.1406	M Blank
PK	74	CP	74	typ	S	-0.2899	M Blank
PK	75	CP	75	typ	S	-0.2191	M Blank
PK	76	CP	76	typ	S	-0.2220	M Blank
PK	77	CP	77	typ	S	-0.2614	M Blank
PK	78	CP	78	typ	S	-0.2458	M Blank
PK	79	CP	79	typ	S	-0.2669	M Blank
PK	80	CP	80	typ	S	-0.3063	M Blank.
PK	81	CP	81	typ	S	11.19	9011201-06 500x = 5595.0
PK	82	CP	82	typ	S	50.12	CCW (100.2%)
PK	83	CP	83	typ	S	-0.1729	M CCB
PK	84	CP	84	typ	H	99.28	
PK	85	CP	85	typ	L	4.577	
PK	86	CP	86	typ	L	4.510	
PK	87	CP	87	typ	G	99.42	
Last base						391	

5595
6286 $\bar{x}$ = 5940.5

Sample statistics

Anal	level	cups	avg	std dev	cv
1	all	74	37.09	34.0	92%

Anal 1: quadratic fit
Carryover factor: 0.20%.

Chart saved to file B:9033701.CHR.

text file B:9033701.TXT has been saved to disk.

000017

Alkalinity STD Methods 403A
To Ph 4.5

Standardizing H_2SO_4 (Scotts Part II Page 2194)
Titrate to pH 4.5, Boil gently 15 min
Cool, and finish titrating to ph 4.2

41.20
0.00
41.20

$$\frac{.0438g\ Na_2CO_3}{41.2 \times 0.053} = 0.02006\ N\ H_2SO_4$$

ICU 2.5 — 0.00 — 2.50

1176-01 38.3 — 2.5 — 35.8

1176-01D 35.65 — 0.00 — 35.65

1176-02 39.8 — 0.00 — 39.8

1230-02 24.5 — 0.00 — 24.5

1178-05 23.75 — 0.00 — 23.75

1178-02 1.95 — 0.00 — 1.95 (4.5) 2.13 (4.2)

1178-03 40.7 — 0.00 — 40.70

1179-04 24.60 — 2.13 — 22.47

1178-01 11.60 — 0.00 — 11.60

9011148-09 3.25 — 0.00 — 3.25

9011148-09 Dupe 6.70 — 3.50 — 3.20

Weighing

Sample #	Ph	Result mg $CaCO_3$/L
ICU (WP 937)	7.35	25.075
9011176-0C	7.167	359.07
0CD	7.182	357.57
02C	7.282	399.19
9011230-02	6.11	245.74
9011176-05	6.530	238.21
-04	6.879	~~14~~ 225.
-03	6.909	408.22
-02	6.077	14.75
-01	6.719	116.35
9011148-09	8.983	32.60
09Dupe	8.986	32.10

9011148-09 $\bar{x}$ = 32.35

Calculation:

$$\frac{\text{ml titrant} \times N \times 50000}{\text{Sample vol.}} = \text{mg } CaCO_3$$

Reported to ph 4.5

All samples 100 ml sample volume.

OL based a 0.1 N difference

December 11, 1996
NEEDHAM

TO Ph 4.5

Alkalinity STD methods 403A

(mg CaCO3)

STANDARDIZATION OF H_2SO_4
Ref Scotts STD Methods of Chem Analysis
Volume II page 2194

$$\frac{.0426g\ NA_2CO_3}{40.3 \times .053} = 0.0199\ N\ H_2SO_4$$

0.00 / 40.3

TCU 1.23

50ml vol 0.00 / 1.23

1176-03 2.7 / 2.5
Ph 4.5 0.2
4.2 0.31

1176-04 3.1 / 3.0
4.5 0.1
4.2 0.2

1176-05 ~~38.6~~ 42.11 / 3.5 / 38.61

1176-06 38.91 / 0.00 / 38.91

1176-07 38.33 / 0.00 / 38.33

1176-08 38.7 / 0.00 / 38.7

1176-08D 38.75 / 0.00 / 38.75

1176-09 29.05 / 0.00 / 29.05

1176-10 38.0 / 0.00 / 38.0

1176-11 35.3 / 0.00 / 35.3

1176-12 32.75 / 0.00 / 32.75

11263-01 39.41 / 0.00 / 39.41

12029-01 2.05 / 0.00 / 2.05

12029-02 4.30 / 2.05 / 2.25

11282-01 37.33 / 4.30 / 33.03

11280-01 10.85 / 0.00 / 10.85

11280-02 2.30 / 0.00 / 2.30

11280-03 40.47 / 2.30 / 38.17

28-04 22.30 / 0.00 / 23.50

11280-05 39.4 / 0.00 / 39.4

11288-01 16.63 / 0.00 / 16.69

~~11288-07~~

11288-07 / 0.00 / 4.5 0.15 / 4.2 0.35

11288-03 37.8 / 0.00 / 37.80

11288-04 21.5 / 0.00 / 21.50

11288-05 16.8 / 0.00 / 16.80

Sample #	Ph	Rsult.
ICU (upper)		24.48 TCU
9011176-03	6.01	0.90 <F
04	5.36	0<.9
05	7.55	384.17
06	8.16	387.15
07	8.075	391.38
08	8.20	385.07
08D	8.21	385.56
09	7.70	289.05
10	8.13	378.10
11	7.86	351.24
12	7.69	325.86
9011263-01	7.60	392.13
9012029-01	7.22	20.40
02	6.99	22.39
9011282-01H	6.60	328.65
9011280-01	6.63	107.96
02	6.10	22.89
03	6.83	379.79
04	6.93	231.84
05	6.60	392.03
9011288-01	7.95	166.07
02	5.88	0
03	7.20	376.11
04	7.91	213.93
05	8.01	167.16

Detection Limit based on 0.1m Titrant Thus 0.99

Note *

All sample volumes 100 mls except ICU 50 mls

CALCULATION ml titrant × N × 50000 ÷ sample vol = mg CaCO3/L
Low level 2·(Ph 4.5) − 4.2 × N × 50000 ÷ sample vol.

NSEDHAM
Nov. 29th, 1990

Fluoride STD methods 413b

Sample/Std	mV	Results (mg/L)
0 ppm	369	
1.0	294	r = -0.9999
5.0	252	
10.0	233	
LCS/ICV WP987	292	1.08 TRUE VALUE 1.0 Limits 0.89-1.09
ICB	365	
PB	367	
9011176-01	292	1.08
01D	293	1.04
01S	265	3.01 3.01-1.08 = 1.93 ÷ 2 = 96.5% Spike Recovery
02	293	1.04
9011096 01	277	1.930
02	291	1.144
9011148 02	253	4.761
02D	253	4.761 $\bar{x}$ = 4.761
9010260-01	346	<1
CCV	251	5.11 (5ppm) 102.3%
CCB	369	
9011032-01	330	<1
02	350.9	<1
03	267.3	2.79
04	331	<1
05	343	<1
CCV C	250	5.327 (106.5%)
CCB	369	

Spike
Spiked with WP 987
CONCENTRATE = 100 ppm
0.1 ml x 100 ÷ 5 = 2 ppm

0000020

December 7, 1990
NEEDHAM

Fluoride STANDARD methods 413 b

Sample/Std	mV	Result (mg/L)	
0 PPM	352		
1.0	283	$\bar{r}$=1.0000	
5.0	240		
10.0	222		
ICV/LCS	283	0.9974	True value 1.0 Limits 0.89-1.09
ICB	350		
Pb	351		
9011032-01			
02			
03		01-05 Analyzed on November 29th.	
04			
05			
06	307	<1	
07	297	<1	
08	~~301~~ 291	1.08	
09	304	<1	
CCV	240	5.04	(100.8 %)
CCB	350		
10	314	<1	
11	299	<1	
12	331	<1	
13	342	<1	
14	305	<1	
9011033-15	325	<1	
16	351	<1	
17	341	<1	
18	299	<1	
19	301	<1	
CCV	242	4.67	(93.5 %)
CCB	357		
20	335	<1	
21	341	<1	
22	334	<1	
23	330	<1	
24	287	<1	
25	291	<1	

NEEDHAM

Fluorides Continued

Sample/Sta	mV	Results (mg/L)	
9011033-26	349	<1	Samples 01, 01D, 015, 02 Analyzed 11/29
27	369	<1	
9011176-03	353	<1	
04	381	<1	
CW	242	4.68	(93.6 %)
CW3	350	<1	
05	287	<1	
06	280	1.12	
07	280	1.12	
08	279	1.16	
09	282	1.04	
10	280	1.12	
11	283	0.997	
12	282	1.04	
9011263-01	275	1.16	
-02	280	1.12	
CW	241	4.86	(97.1 %)
CW3	350		
-015	252	3.21	3.21 − 1.16 = 2.05 ÷ 2 ppm = 102.5 % Spike Recov.
CW	243	4.8	(90.1 %)
CW3	350		

Spike

Spiked with WP 987
Concentrate = 100 ppm
0.1 ml x 100 ÷ 5 = 2 ppm

pH

11/15

	~~Analysis Date~~	pH
9011176 -01	11/15	7.20
02	11/21	7.21
03	11/27	6.10
04		5.39
05		7.31
06		8.11
07		8.00
08		8.28
08D		8.31
09		7.62
10		8.01
11		7.95
12		7.62

SULFATES (426C STANDARD METHODS)

JON ST THOMAS
Dec 12, 1990

① Add 20mls buffer
② Add $BaCl_2$ & stir for 1 min
③ Read after 6 min/10 sec @ 420nm

Sample/STD	abs w/o $BaCl_2$	abs w/ $BaCl_2$	sample vol	mg/L results	QC
0		0.000	100ml		
5		~~0.019~~ 0.005			
10		0.019			
15		0.039		r=.9879	
30		0.115			
40		0.171			
LCS/ICV (20ppm)	0	0.060		17.0	85.0%
ICB	0	0.000		<5.0	
PB	0	0.000		<5.0	
9011176-01	0.600	0.098	50ml	x2 = 51.1	
-02		0.094	50ml	x2 = 49.3	
-03		0.002	100ml	<5.0	
-04		0.001	100ml	<5.0	
-05		0.099	50ml	x2 = 51.6	
-06		0.067	50ml	x2 = 37.1	
-07		0.065	50ml	x2 = 36.2	
-08		0.067	50ml	x2 = 37.1	
-08D		0.066	50ml	x2 = 36.6	
CCV (25ppm)		0.090	100ml	23.7	94.8%
CCB		0.003	100ml	<5.0	
96% recovery -08S (20ppm) x2=40ppm		0.152	50ml	x2 = 75.5	
-09		0.063	50ml	x2 = 35.3	
-10		0.083	50ml	x2 = 47.3	
-11		0.109	50ml	x2 = ~~27.~~ 56.1	
-12		0.072	50ml	x2 = 39.4	
9011280-01		0.143	50ml	x2 = 71.4	
0000124 02		0.101	100ml	26.2	
03		0.113	50ml	x2 = 57.9	
04		0.113	50ml	x2 = 57.9	
05		0.127	50ml	x2 = 61.9	

December 1990
[illegible]

Specific Conductivity

(µS/cm) Sample # / Ice/Ices	~~Ohms~~ ~~244-288~~	Mult	Cell const. 0.01C273	Temp 21.0°C	Result (Ohms/cm) 251.6 True Val 267 Limits 24
				21.0	Limits 247-288
901257-01	2875	10			
Pb	8000	0.01		23C	0.866
901276-01	7500	10			812.61
02	720	100			780.1
03	2275	0.1			2.46
04	1830	0.1			1.98
05	730	100			790.94
06	710	100			769.27
07	725	100			785.52
08	720	100			780.1
09	720	100			780.1
09	625	100			677.17
10	730	100			790.95
11	725	100			785.52
12	670	100			725.93
901277-01	420	10			45.57
02	770	100			834.77
03	860	10			93.18
901283 01	730	100			790.94

Calculation:

ohms × mult × cell const ÷ 1 + 0.025 (T-25)

:mmm25

Reduced Nov
SC11176 changed to 01C 11/28

Oct 3C4 TSS 200 ml's

16 4700
(45) 16.4680 2.0 x 1000/200 = 10.0 mg/L
0 0020

TDS 100 mls @ 180°C

50 3765
50.3150 61.5 x 1000/100 = 615 mg/L
0.0615

02C
TSS 200 ml's

16.8965
(3E) 16.8955 1.0 x 1000/200 = 5.0 mg/L
0.0010

TDS 100 ml's

52 3435
52 2790 64.5 x 1000/100 = 645 mg/L
0 0645

CA 11/29/10

Detech Inst based on 1.0 mg
Woodward Clyde

9011176	12/6/90
TSS $\frac{1000}{300} = 3.33$	TDS $\frac{1000}{100} = 10$
03C 300 ml's	100 ml's ✓
18 1426	50.3210
(14) 18.1423	50.3210 = 0.00 mg/L
0.0003 RPT < 3.3 ✓	0.0000 RPT < 10.0
0.3 × 3.33 = 1.0 mg/L	
04C 300	100 ml's
17.2037	50.9932 RPT ✓ < 10.0
(24) 17.2035 RPT < 3.3	50.9930
0.0002 ✓	0.0002 = 2.0 mg/L
0.2 × 3.33 = 0.67 mg/L	0.2 × 10
05C 300	100 ml's
19.3593	50.9180 ✓
(28) 19.3590 < 3.3 ✓	50.8625
0.0003	0.0555 = 555 mg/L
0.3 × 3.33 = 1.0 mg/L	55.5 × 10
06C 300 ml	100 ml's
17.6450 RPT < 3.3	50.1640 ✓
(31) 17.6448 ✓	50.1100
0.0002	0.0540
0.2 × 3.3 = 0.67 mg/L	54.0 × 10 = 540 mg/L
07C 300 ml	100 ml's
20.1834	48.4690 ✓
(35) 20.1832 RPT < 3.3 ✓	48.4140
0.0002	0.0550
0.2 × 3.33 = 0.67 mg/L	55.0 × 10 = 550 mg/L
08C 300 ml's	100 ml's
19.8150 RPT	52.3355 ✓
(39) 19.8145 < 3.3 ✓	52.2805
0.0005	0.0550 = 550 mg/L
0.5 × 3.33 = 1.67 mg/L	55.0 × 10
09C 300 ml's RPT	100 ml's ✓
17.5290	51.5330
(44) 17.5288 < 3.3 ✓	51.4825
0.0002	0.0505
0.0002 × 3.33 = 0.67 mg/L	50.5 × 10 = 505 mg/L

CA 12/7/90

Woodward Clyde

9011176 12/6/90

TSS	TDS
09C dup 3ccml's	1ccml's
16.4684	45.2085
(45) 16.4682 ✓	45.1565 ✓
0.0002 RPT <3.3	0.0520
0.2 × 3.33 = 0.67 mg/L	52.0 × 1000 / 100 = 520 mg/L
10 C 3ccml's	1ccml's
17.9621	44.5765 ✓
(46) 17.9618 ✓	44.5310
0.0003 RPT <3.3	0.0455
0.3 × 3.33 = 1.0 mg/L	45.5 × 10 = 455 mg/L
11 C 3ccml's	1ccml's
18.2546	50.8555
(48) 18.2543 ✓	50.8030
0.0003 RPT <3.3	0.0525 ✓
0.3 × 3.33 = 1.0 mg/L	52.5 × 10 = 525 mg/L
12C 3ccml's	1ccml's
16.1080 ✓	53.8265 ✓
(57) 16.1075	53.7760
0.0005 RPT <3.3	0.0505
0.5 × 3.33 = 1.67 mg/L	50.5 × 10 = 505 mg/L

CA 12/7/90

DOOR28

Quality Control Sample Woodward 9
WP 1187 Concl 9011176
Prepared by D.N 12/7/90

TSS 5ccml's

weigh Dish (G) 16.2350
16.2210
T 0.0140

$14.0 \times \frac{1000}{500} = 28.0$ mg/L

TDS @ 180°C 100ml's

weight Evap dish 49.7215
49.6780
0.0435

$43.5 \times \frac{1000}{100} = 435$ mg/L

DN 12/10/90

0000029

→ See Sample # 02CWC1003, COC #005 at TMA/Nored for Radionuclide Assay ←

Woodward-Clyde Consultants
Stanford Place 3 Suite 1000 4582 South Ulster Street Parkway
Denver Colorado 80237 (303) 694 2770

Chain of Custody Record
COC # 012

PROJECT NO: 22558 Task 500

SAMPLERS: (Signature) BT Clow

DATE	TIME	SAMPLE NUMBER	Wet Chem.*	NO_3/NO_2	NUMBER OF CONTAINERS
11/26/90		20 GAO 7001	X	X	2
		20 GAO 5002	X	X	2
		~~20~~ 21 GAO 1004	X	X	2
		~~21 GAO 2005~~	X	X	~~2~~ BT 11/26/90
		21 GAO 1006	X	X	2
		21 GAO 2007	X	X	2
		21 GAO 8008	X	X	2
		22 GAO 1009	X	X	2
		23 GAO 1010	X	X	2
		24 GAO 1011	X	X	2
		25 GAO 1012	X	X	2
				TOTAL NUMBER OF CONTAINERS	20 ~~22~~ BT 11/26/90

BT Clow 11/26/90

REMARKS (Sample preservation handling procedures etc.)

For TMA-Skinner/Sherman

Matrix – Water

BT 11/26/90

All samples stored on ice

*Wet Chem: Cl^-, F^-, Carb/Bicarb, pH, Sulfate, TDS, TSS, Conductivity

– NO_3/NO_2 preserved w/ H_2SO_4 to pH<2

– Sample # 21 GAO 8008 is a Matrix Spike/Matrix Spike Duplicate Sample

Contact personnel
Brian Clow
(303) 279-4501 x205

RELINQUISHED BY (Signature)	DATE/TIME	RECEIVED BY (Signature)	RELINQUISHED BY (Signature)	DATE/TIME	RECEIVED BY (Signature)
BT Clow	11/26/90 1700				

METHOD OF SHIPMENT	SHIPPED BY (Signature)	COURIER (Signature)	RECEIVED FOR LAB BY (Signature)	DATE/TIME
			[illegible]	11/27/90 9:30

see Sample No. 01CWC1001, COC# 001 at TMA/Norcal for Rad.

Woodward-Clyde Consultants
Stanford Place 3 Suite 1000 4582 South Ulster Street Parkway
Denver Colorado 80237 (303) 694-2770

Chain of Custody Record
COC # 002

PROJECT NO. 22558 Task 500

SAMPLERS (Signature) BR Clow

DATE	TIME	SAMPLE NUMBER	Metals	Major Ions*	Nitrate/Nitrite					NUMBER OF CONTAINERS
11/13/90	1135	01CWC1001	1	1	1					3

BR Clow 11/14/90

REMARKS (Sample preservation handling procedures, etc.)
For TMA-Skinner/Sherman

Matrix- Water

All samples stored on ice.

*Major Ions:
Chloride
Flouride
Carbonate/Bicarbonate
pH
Sulfate
T.D.S.
T.S.S.
Conductivity

- Metals preserved w/ HNO_3 to pH<2
- NO_3/NO_2 preserved w/ H_2SO_4 to pH<2

Contact personnel:
Brian Clow
(303) 279-4501 x205

TOTAL NUMBER OF CONTAINERS

RELINQUISHED BY: (Signature)	DATE/TIME	RECEIVED BY: (Signature)	RELINQUISHED BY: (Signature)	DATE/TIME	RECEIVED BY (Signature)
BR Clow	11/14/90 1700				000107

METHOD OF SHIPMENT:	SHIPPED BY: (Signature)	COURIER (Signature)	RECEIVED FOR LAB BY: (Signature)	DATE/TIME
Fed Ex			[illegible]	11/15/90

See Sample # 02CWC1003, COC # 005 re TMA/Warnal for Radionuclide Assay

Woodward-Clyde Consultants
Stanford Place 3 Suite 1000 4582 South Ulster Street Parkway
Denver Colorado 80237 (303) 694 2770

Chain of Custody Record

COC # 006

PROJECT NO. 22558 Task 500

SAMPLERS: (Signature) BZ Claw

DATE	TIME	SAMPLE NUMBER	Metals	Wet Chem.*	NO_3/NO_2					NUMBER OF CONTAINERS
11/20/90	1100	02CWC1003	X	X	X					3

ANALYSES

REMARKS (Sample preservation handling procedures etc.)
For TMA-Skinner/Sherman

Matrix – Water

All samples stored on ice

*Wet Chem:
Cl^-, F^-, Carb/bicarb, pH, Sulfate, TDS, TSS, Conductivity

– Metals preserved w/ HNO_3 to pH<2

– NO_3/NO_2 preserved w/ H_2SO_4 to pH<2

BZ Claw 11/20/90

Contact personnel
Brian Claw
(303) 279-1501 x205

TOTAL NUMBER OF CONTAINERS

RELINQUISHED BY (Signature)	DATE/TIME	RECEIVED BY (Signature)	RELINQUISHED BY (Signature)	DATE/TIME	RECEIVED BY (Signature)
BZ Claw	11/20/90 1700				

METHOD OF SHIPMENT	SHIPPED BY (Signature)	COURIER (Signature)	RECEIVED FOR LAB BY (Signature)	DATE/TIME
Fed Ex	[signature]		[signature]	11/21/90 9:30

AB 11/21/90

FEDERAL EXPRESS

QUESTIONS? CALL 800 238 5355 TOLL FREE

AIRBILL
PACKAGE TRACKING NUMBER 9727723246

9727723246

Date 11/30/90

RECIPIENT'S COPY

1 From (Your Name) Please Print: Brian Clow
Your Phone Number (Very Important): (303) 279-1[illegible]
Company: Woodward-Clyde Federal Services
Department/Floor No
Street Address: 1600 Indiana St
City: Golden State: Colo. ZIP Required: 80403

2 To (Recipient's Name) Please Print: Paul Bryce
Recipient's Phone Number (Very Important): (617) 890-7200
Company: TRW - Skinner/Sherman
Department/Floor No
Exact Street Address (We Cannot Deliver to P.O. Boxes or P.O. Zip + Codes.): 700 Second Ave.
City: Waltham State: Mass ZIP Required: 02254

YOUR INTERNAL BILLING REFERENCE INFORMATION (First 24 characters will appear on invoice): -11020-510

H IF HOLD FOR PICK UP Print FEDEX Address Here
Street Address
City State ZIP Required

3 PAYMENT 1 [X] Bill Sender 2 [ ] Bill Recipient's FedEx Acct No. 3 [ ] Bill 3rd Party FedEx Acct No 4 [ ] Bill Credit Card
5 [ ] Cash/Check

4 SERVICES (Check only one box)

Priority Overnight Service (Delivery by next business morning†)
11 [X] YOUR PACKAGING
16 [ ] FEDEX LETTER
12 [ ] FEDEX PAK *
13 [ ] FEDEX BOX
14 [ ] FEDEX TUBE

Standard Overnight Service (Delivery by next business afternoon†)
51 [ ]
56 [ ] FEDEX LETTER *
52 [ ] FEDEX PAK *
53 [ ] FEDEX BOX
54 [ ] FEDEX TUBE

Economy Two-Day Service (formerly Standard Air) (Delivery by second business day†)
30 [ ] ECONOMY TWO-DAY SVC

Heavyweight Service (for Extra Large or any package over 150 lbs.)
70 [ ] HEAVYWEIGHT
80 [ ] DEFERRED HEAVYWEIGHT

† Delivery commitment may be later in some areas
*Declared Value Limit $100
**Call for delivery schedule

DELIVERY AND SPECIAL HANDLING (Check services required)†
1 [ ] HOLD FOR PICK UP (Fill in Box H)
2 [X] DELIVER WEEKDAY
3 [ ] DELIVER SATURDAY (Extra charge) (Not available in all hub stations)
4 [ ] DANGEROUS GOODS (Extra charge)
5 [ ]
6 [ ] DRY ICE
7 [ ] OTHER SPECIAL SERVICE
8 [ ]
9 [ ] SATURDAY PICK UP (If extra charge)
10 [ ]
11 [ ]
12 [ ] HOLIDAY DELIVERY (If offered) (Extra charge)

PACKAGES	WEIGHT In Pounds Only	YOUR DECLARED VALUE
1		3000
Total 1	Total 60	Total 3000

DIM SHIPMENT (Chargeable Weight) [ ] ____ lbs

Received At
1 [ ] Regular Stop 3 [ ] Drop Box
2 [ ] On Call Stop* 4 [ ] BSC
5 [ ] Station

FedEx Emp No [illegible]

Emp No Date
[ ] Cash Received
[ ] Return Shipment
[ ] Third Party [ ] Chg To Del [ ] Chg To Hold
Street Address
City State Zip
Received By X [signature]
Date/Time Received 11/27/90 FedEx Employee Number 930

5 Release Signature
Date/Time [illegible]

Federal Express Use
Base Charges
Declared Value Charge
Other 1
Other 2
Total Charges

REVISION DATE 8/90
PART #119500 GBFE
FORMAT #041
041
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QUESTIONS? CALL 800-238-5355 TOLL FREE.

AIRBILL PACKAGE TRACKING NUMBER 7578275725

7578275725

RECIPIENT'S COPY

Date 11/11/90

1 From (Your Name) Please Print: [illegible] Clark
Your Phone Number (Very Important): (303) 279-1157
Company: United Clyde Medical Services
Department/Floor No.
Street Address: 1001 [illegible] ST
City: [illegible] State: CO ZIP Required: 80413

2 To (Recipient's Name) Please Print: Sample Recipient
Recipient's Phone Number (Very Important): (800) 779-[illegible]
Company: TMA [illegible]
Department/Floor No.
Exact Street Address (We Cannot Deliver to P.O. Boxes or P.O. Zip + Codes.): 300 Second Ave
City: Whitman State: MA ZIP Required: 1[illegible]

YOUR INTERNAL BILLING REFERENCE INFORMATION (First 24 characters will appear on invoice.): [illegible]

4 IF HOLD FOR PICK-UP, Print FEDEX Address Here
Street Address
City State ZIP Required

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16 [ ] FEDEX LETTER *
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13 [ ] FEDEX BOX
14 [ ] FEDEX TUBE

Standard Overnight Service (Delivery by next business afternoon†)
51 [ ]
56 [ ] FEDEX LETTER *
52 [ ] FEDEX PAK *
53 [ ] FEDEX BOX
54 [ ] FEDEX TUBE

Economy Service (Formerly Standard Air) (Delivery by second business day†)
30 [ ] ECONOMY SERVICE

Heavyweight Service (for Extra Large or any package over 150 lbs.)
70 [ ] HEAVYWEIGHT **
80 [ ] DEFERRED HEAVYWEIGHT **

†Delivery commitment may be later in some areas.
*Declared Value Limit $100.
**Call for delivery schedule.

DELIVERY AND SPECIAL HANDLING
1 [ ] HOLD FOR PICK-UP
2 [X] DELIVER WEEKDAY
3 [ ] DELIVER SATURDAY
4 [ ] DANGEROUS GOODS
5 [ ] CONSTANT SURVEILLANCE SVC. (CSS)
6 [ ] DRY ICE
7 [ ] OTHER SPECIAL SERVICE
8 [ ]
9 [ ] SATURDAY PICK-UP
10 [ ]
11 [ ]
12 [ ] HOLIDAY DELIVERY

Pieces	Weight	Value
1	17	2000
Total	Total	Total

DIM SHIPMENT (Heavyweight Services Only) [ ] lbs.

Received At: 1 [ ] Regular Stop 3 [ ] Drop Box 4 [ ] B.S.C. 2 [ ] On-Call Stop 5 [ ] Station

FedEx Emp. No. Date/Time

Firm No. Date
[ ] Cash Received
[ ] Return Shipment
[ ] Third Party [ ] Chg. To Dpt. [ ] Chg. To Hold
Street Address
City State Zip
Received By: X [signature]
Date/Time Received: 11/15/90 7:30 FedEx Employee Number

5 Release Signature: Date/Time

Federal Express Use
Base Charge
Declared Value Charge
Other 1
Other 2
Total Charges

REVISION DATE 11/89
PART #119500 SRCEF 4/90
FORMAT 8014
014
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PRINTED IN U.S.A.

000104

FEDERAL EXPRESS

QUESTIONS? CALL 800 238 5355 TOLL FREE

AIRBILL
PACKAGE TRACKING NUMBER 9727723224

9727723224

RECIPIENT'S COPY

Date 11/26/96

1 From (Your Name) Please Print: [illegible]
Your Phone Number (Very Important): (303) 377-[illegible]
Department/Floor No.
Company: [illegible] Clyde Global Services
Street Address: [illegible] Indiana St
City: [illegible] State: CO ZIP Required: 80113

2 To (Recipient's Name) Please Print: Paula Bryce
Recipient's Phone Number (Very Important): (617) 890-7200
Department/Floor No.
Company: Timi-Skimer/Chemron
Exact Street Address (We Cannot Deliver to P.O. Boxes or P.O. Zip + Codes.): 300 Second Ave
City: Waltham State: Mass. ZIP Required: 02254

YOUR INTERNAL BILLING REFERENCE INFORMATION (First 24 characters will appear on invoice.): [illegible]

H IF HOLD FOR PICK-UP Print FEDEX Address Here
Street Address
City State ZIP Required

3 PAYMENT 1 [X] Bill Sender 2 [ ] Bill Recipient's FedEx Acct. No. 3 [ ] Bill 3rd Party FedEx Acct. No. 4 [ ] Bill Credit Card
5 [ ] Cash/Check

4 SERVICES (Check only one box)

Priority Overnight Service (Delivery by next business morning†)
11 [X] YOUR PACKAGING
16 [ ] FEDEX LETTER *
12 [ ] FEDEX PAK *
13 [ ] FEDEX BOX
14 [ ] FEDEX TUBE

Standard Overnight Service (Delivery by next business afternoon†)
51 [ ]
56 [ ] FEDEX LETTER *
52 [ ] FEDEX PAK *
53 [ ] FEDEX BOX
54 [ ] FEDEX TUBE

Economy Two-Day Service (Formerly Standard Air) (Delivery by second business day†)
30 [ ] ECONOMY TWO-DAY SVC.

Heavyweight Service (for Extra Large or bulky package over 150 lbs.)
70 [ ] HEAVYWEIGHT **
80 [ ] DEFERRED HEAVYWEIGHT **

† Delivery commitment may be later in some areas
*Declared Value Limit $100.
**Call for delivery schedule

DELIVERY AND SPECIAL HANDLING (Check services required)
1 [ ] HOLD FOR PICK-UP (Fill in Box H)
2 [X] DELIVER WEEKDAY
3 DELIVER SATURDAY (Extra charge) [ ] (Not available to all locations)
4 [ ] DANGEROUS GOODS (Extra charge)
5 [ ]
6 [ ] DRY ICE Lbs.
7 [ ] OTHER SPECIAL SERVICE
8 [ ]
9 [ ] SATURDAY PICK-UP (Extra charge)
10 [ ]
11 [ ]
12 [ ] HOLIDAY DELIVERY (If offered) (Extra charge)

PACKAGES	WEIGHT In Pounds Only	VALUE DECLARED $100 MAX
1	26	2000
Total	Total	Total
1	26	

DIM SHIPMENT (Chargeable Weight) [ ] ____ lbs.

Received At
1 [ ] Regular Stop 3 [ ] Drop Box
2 [ ] On-Call Stop 4 [ ] B.S.C. 5 [ ] Station

FedEx Emp. No. 7258 Date/Time 1510

Emp. No. Date
[ ] Cash Received
[ ] Return Shipment
[ ] Third Party [X] Chg. To Del. [ ] Chg. To Hold
Revised Address
City State Zip
Received By X [illegible]
Date/Time Received 11/27/96 9:30 FedEx Employee Number

5 Release Signature:

Federal Express Use
Base Charges
Declared Value Charge
Other 1
Other 2
Total Charges

REVISION DATE 8/90
PART #119500 GBFC
FORMAT #041
041
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