QUARTERLY RESPIROMETER TEST 4 OF 5

BUILDING 986 POL LABORATORY

SOIL VAPOR EXTRACTION AND BIO-VENTING OPERATIONS AND MAINTENANCE

FORT RICHARDSON, ALASKA
CONTRACT NO. DACA85-01-P-0080

Prepared for:

U.S. Army Corps of Engineers, Alaska District
CEPOA-PM-M-A
P. O. Box 6898
Elmendorf AFB, Alaska 99506-6898

Prepared By:

AGVIQ, Inc.
2121 Abbott Road Suite 100
Anchorage, Alaska 99507

Project #200110

December 2002

OPERATIONAL MONITORING

AGVIQ, Inc. inspected the soil vapor extraction (VE) and bio-venting (BV) system for proper operational parameters. The system appeared to be operating normally, as designed and was tested as initially configured. Power indicators and alarms were operational. The system airflow was free flowing, did not have excessive vacuum, the lower explosive limit (LEL) concentrations were low and the condensate tank was empty and unobstructed.

RESPIROMETER TESTING

Since the VE/BV system re-start on August 2, 2002, AGVIQ has performed three operational monitoring events at the Building 986 POL Lab. During each of these events, initial soil vapor readings were collected from three (3) monitoring points (MP-1, MP-2 and MP-3). Readings using a Combustible Gas Indicator (CGI) were collected from each of the monitoring points. The first two events took place on August 15 and September 17, 2002. The third monitoring event occurred on October 17, 2002 in conjunction with the quarterly respirometer testing. These monthly monitoring events consisted of soil vapor readings, airflow rates (CFM) and vacuum (inches of H2O) measurements from each vent well. The concentrations of volatiles (ppm) were measured with a calibrated photo-ionization detector (PID) from each vent well at the VE manifold. On October 17, 2002 the third respiration testing of this yearly sequence of O & M activities was performed for a period of eight (8) days. Prior to shutting off the blower for the respirometer test, the VE system was configured to extract air from VE wells 1, 2 and 3, an initial effluent sample was collected, and initial soil vapor readings were collected from three (3) monitoring points. Soil vapor readings were also collected daily over the next seven (7) days and the blower was restarted on October 24, 2002.

ANALYTICAL SAMPLING PROGRAM

Effluent Sampling

Effluent samples were collected from the VE system exhaust stack, prior to shutdown, to estimate hydrocarbon-mass removal rates for this configuration. The samples were collected from the exhaust stack using laboratory-prepared 1-liter stainless steel canisters. The samples were sent to CT&E of Anchorage, Alaska. The effluent samples were analyzed for the following parameters:

- Benzene, Toluene, Ethylbenzene and Xylenes (BTEX) by EPA 8021B
- Gasoline Range Organics (GRO) by AK 101; and
- Methane, carbon dioxide, oxygen and nitrogen by ASTM D-1945

The second sample collected on October 17, 2002 was accidentally analyzed twice for GRO/BTEX by the laboratory. On October 29, 2002, five days after restarting the system, AGVIQ re-sampled for Methane, carbon dioxide, oxygen and nitrogen by ASTM D-1945.

FINDINGS

Effluent Sampling

The reported analytical results for GRO and BTEX constituents in the exhaust air sample were undetectable (Table 1) at levels stated in the laboratory report. The air sample analytical results indicate that the percent levels of oxygen and nitrogen are similar to the concentrations found in the atmosphere. The methane and carbon dioxide results were similar to the previous respirometer test (Table 1). The concentrations of volatiles in the exhaust air at the time of sample collection were low (Table 4). All of the analytical results from the effluent air samples collected during the respirometer sampling event are presented in Appendix A.

Monitoring Events

The CGI results from the monitoring events are presented in Appendix B. The readings at MP-1 suggest biological activity due to the decrease in oxygen and the increase in carbon dioxide, during the extent of the monitoring period. This trend is slightly greater at 20 ft bgs than at 10 ft bgs. This implies that biological activity may be occurring in the vicinity of MP-1 and perhaps a slightly higher amount of activity may be taking place at the greater depth. MP-1 is located in the vicinity of the former dry well (Appendix C).

The readings from MP-2 also exhibited evidence of biological activity; however, there was less evidence of biological activity seen at 10 ft bgs than was exhibited at the same depth at MP-1. Evidence of a considerably higher amount of microbial activity is seen at the 20 ft bgs depth at this location.

MP-3 is located outside of the primary contaminated area at the former dry well location. Some minor activity was observed at both depths in this location.

To assist in assessing the VE/BV system performance, the airflow rates (CFM) and vacuum (inches of H_2O) were measured from each vent well, and concentrations of volatiles (ppm) were measured from each vent well at the exhaust manifold. The airflow rates measured at the VE blower during the fourth respirometer test ranged between 14 and 23 CFM and the applied vacuum levels at the VE blower ranged between 0 and 14.3 inches of H_2O. The concentration of volatiles ranged between 0.0 and 2.8 ppm. The airflow, vacuum and concentration of volatiles results for all three monitoring events are listed in Tables 2-4.

CONCLUSION

Review of the monitoring and analytical data indicates that the VE/BV system is most likely remediating the subsurface soils in the vicinity of the former dry well located at Building 986. The observations indicate that the remediation is progressing by two processes; bioremediation through the utilization of oxygen in the soil gas and, to a lesser degree, physical removal of hydrocarbon vapors. The physical removal is diminished due to the age of the system and remedial process.

Evidence of bioremediation and physical removal is obtained through sampling and analysis of the extracted soil gas. Analysis of the VE system effluent for petroleum hydrocarbons indicates that the VE system is successfully extracting contaminants. The presence of elevated CO_2 concentrations in the soil gas analyzed from the VE system exhaust stack may be an indication of hydrocarbon biodegradation in the site soils. In addition, oxygen concentrations in the soil gas indicate that the oxygen is not currently limiting hydrocarbon biodegradation. Similarly, the data collected from the three soil gas monitoring points indicate by the increase in CO_2 concentrations (Appendix D) and significant decrease in O_2 concentrations (Appendix E) that biodegradation is occurring in the soils at the site where contamination was initially discovered through investigation activities.

Based on the monthly monitoring, respirometer, and analytical test data, the system operational configuration was not changed. The system was configured as listed in Table 4 - Soil Vapor Extraction & Bio-Venting System Operational Data – October 2002.

TABLE 1

AIR SAMPLE ANALYTICAL RESULTS

	---------- PARAMETERS ----------										
SAMPLE ID	**GRO** ppm	**BTEX** ppm	**Benzene** ppm	**Toluene** ppm	**Ethylbenzene** ppm	**P & M-Xylene** ppm	**O-Xylene** ppm	**Oxygen** %	**Nitrogen** %	**Methane** %	**Carbon Dioxide** %
Exhaust 02FRA007AG	20.0U	3.18U	0.780U	0.660U	0.580U	0.580U	0.580U	N/A	N/A	N/A	N/A
Exhaust 02FRA008AG	20.0U	3.18U	0.780U	0.660U	0.580U	0.580U	0.580U	N/A	N/A	N/A	N/A
Exhaust 02FRA009AG	N/A	N/A	N/A	N/A	N/A	N/A	N/A	17	82	U	0.0020

Note:
GRO = Gasoline Range Organics
BTEX = Benzene, Toluene, Ethylbenzene and Total Xylenes
U = Undetectable as listed in the analytical report
N/A = Not Applicable as listed in the analytical report
ppm = parts per million by volume
% = percent by volume

TABLE 2

SOIL VAPOR EXTRACTION & BIO-VENTING SYSTEM OPERATIONAL DATA – AUGUST 2002

---------- PARAMETERS ----------

LOCATION	AIR FLOW (CFM)	VACUUM (inches of H_2O)	CONCENTRATION OF VOLATILES (ppm)	% WELLS OPEN
VE - 1	20	12.9	0.5	100 %
VE - 2	17	9.2	2.8	100 %
VE – 3	14	7.2	2.2	100 %
EXHAUST STACK	23	0.0	2.0	N/A

Note:
CFM = Cubic Feet per Minute
ppm = Parts Per Million
N/A = Not Applicable

TABLE 3

SOIL VAPOR EXTRACTION & BIO-VENTING SYSTEM OPERATIONAL DATA – SEPTEMBER 2002

---------- PARAMETERS ----------

LOCATION	AIR FLOW (CFM)	VACUUM (inches of H2O)	CONCENTRATION OF VOLATILES (ppm)	% WELLS OPEN
VE - 1	20	12.5	0.0	100 %
VE - 2	16	8.8	0.0	100 %
VE – 3	14	6.8	0.0	100 %
EXHAUST STACK	23	0.0	0.0	N/A

Note:
CFM = Cubic Feet per Minute
ppm = Parts Per Million
N/A = Not Applicable

TABLE 4

SOIL VAPOR EXTRACTION & BIO-VENTING SYSTEM OPERATIONAL DATA – OCTOBER 2002

---------- PARAMETERS ----------

LOCATION	AIR FLOW (CFM)	VACUUM (inches of H_2O)	CONCENTRATION OF VOLATILES (ppm)	% WELLS OPEN
VE - 1	19	14.3	0.0	100 %
VE - 2	17	9.7	0.0	100 %
VE – 3	15	7.1	0.0	100 %
EXHAUST STACK	21	0.0	0.0	N/A

Note:
CFM = Cubic Feet per Minute
ppm = Parts Per Million
N/A = Not Applicable

Appendix A

Laboratory Analytical Results

CT&E Environmental Services Inc.

CT&E Ref.#	1027162001
Client Name	AGVIQ Inc.
Project Name/#	Bldg 986 FRA
Client Sample ID	02FRA007AG
Matrix	Gas & Air

All Dates/Times are Alaska Standard Time

Printed Date/Time	10/22/2002 15:58
Collected Date/Time	10/17/2002 11:10
Received Date/Time	10/18/2002 16:45
Technical Director	**Stephen C. Ede**

Released By J. Windelbank

Sample Remarks:

Parameter	Results	PQL	Units	Method	Allowable Limits	Prep Date	Analysis Date	Init
Volatile Fuels Department								
Gasoline Range Organics	20.0 U	20.0	ppm	CTE 8015M/8021B		10/21/02	10/21/02	ECG
Benzene	0.780 U	0.780	ppm	CTE 8015M/8021B		10/21/02	10/21/02	ECG
Toluene	0.660 U	0.660	ppm	CTE 8015M/8021B		10/21/02	10/21/02	ECG
Ethylbenzene	0.580 U	0.580	ppm	CTE 8015M/8021B		10/21/02	10/21/02	ECG
P & M -Xylene	0.580 U	0.580	ppm	CTE 8015M/8021B		10/21/02	10/21/02	ECG
Xylene	0.580 U	0.580	ppm	CTE 8015M/8021B		10/21/02	10/21/02	ECG
Surrogates								
1,4-Difluorobenzene <Surr>	97.8		%	CTE 8015M/8021B	60-120	10/21/02	10/21/02	ECG
4-Bromofluorobenzene <Surr>	90.5		%	CTE 8015M/8021B	50-150	10/21/02	10/21/02	ECG

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CT&E Environmental Services Inc.

CT&E Ref.#	1027162002
Client Name	AGVIQ Inc.
Project Name/#	Bldg 986 FRA
Client Sample ID	02FRA008AG
Matrix	Gas & Air

All Dates/Times are Alaska Standard Time

Printed Date/Time	10/22/2002 15:58
Collected Date/Time	10/17/2002 11:14
Received Date/Time	10/18/2002 16:45
Technical Director	**Stephen C. Ede**

Released By J Wendebank

Sample Remarks:

Parameter	Results	PQL	Units	Method	Allowable Limits	Prep Date	Analysis Date	Init
Volatile Fuels Department								
Gasoline Range Organics	20.0 U	20.0	ppm	CTE 8015M/8021B		10/21/02	10/21/02	ECG
Benzene	0.780 U	0.780	ppm	CTE 8015M/8021B		10/21/02	10/21/02	ECG
Toluene	0.660 U	0.660	ppm	CTE 8015M/8021B		10/21/02	10/21/02	ECG
Ethylbenzene	0.580 U	0.580	ppm	CTE 8015M/8021B		10/21/02	10/21/02	ECG
P & M -Xylene	0.580 U	0.580	ppm	CTE 8015M/8021B		10/21/02	10/21/02	ECG
Xylene	0.580 U	0.580	ppm	CTE 8015M/8021B		10/21/02	10/21/02	ECG
Surrogates								
1,4-Difluorobenzene <Surr>	85.9		%	CTE 8015M/8021B	60-120	10/21/02	10/21/02	ECG
4-Bromofluorobenzene <Surr>	94		%	CTE 8015M/8021B	50-150	10/21/02	10/21/02	ECG

F-701

AGVIQ ENVIRONMENTAL SERVICES
2121Abbott Rd. Suite 100
Anchorage, Alaska 99507
phone (907) 341-6299
fax (907) 341-6256

CHAIN OF CUSTODY/LABORATORY ANALYSIS REQUEST

Date 10/18/02 Page 1 of 1 Cooler # COC#

Client AGVIQ Inc	**Sample Conditions**
Project Site: Bldg 786 FRA	Sampled by: PBD Seal #
Sampling Company: AGVIQ, Inc	Seal intact upon receipt by sampling company? Yes No
Sampling Site: BU System Exhaust	Condition of contents:
Project Manager: Darrin Lowless	Sealed for Shipping by:
Team Leader: Scott Kendall	Initial contents temp(C):
Project #: 502001	Sampling status: Continuing unit:
Receiving Lab: CT&E	Seal intact upon receipt by laboratory? Yes No
Address:	Contents temp upon receipt:
Purchase Order # DACA-85-01-2-0080	Condition of contents:

Date	Time	Location ID	Sample ID	Matrix	LabID	DRO AK102	GRO/BTEX AK101/EPA 8021B	Total Organic Carbon EPA 5310B	CH4, CO2, O2, N2 ASTM 1945	Grain Size Dist. ASTM D422	Number of Containers	Comments:
10/17/02	1110	Exhaust	02FRA007AG	Air			X				1	1027162
↓	1114	↓	02FRA008AG	↓					X		1	

ANALYTICAL METHOD REQUESTED

Relinquished by:	Relinquished by:	Relinquished by:
Signature	Signature	Signature
Printed Name Paul B. Davis	Printed Name	Printed Name
Firm AGVIQ, Inc	Firm	Firm
Date/Time 10/18/02 1645	Date/Time	Date/Time
Received by:	**Received by:**	**Received by:**
Signature	Signature	Signature
Printed Name FOREST TAYLOR	Printed Name	Printed Name
Firm CT&E	Firm	Firm
Date/Time 10/18/02 1645	Date/Time	Date/Time

Turnaround Time Required

___Standard (30 days)

___24 hr. ___48 hr.

___3-5 days ___7 days

___14 days ___days

Provide verbal preliminary results?

___Yes ___No

Provide FAX preliminary results? ___Yes ___No

Requested report date _____

EDF data required?

___Yes ___No

Shipping Details

Delivered to shipper by: AGVIQ, Inc

Method of shipment: Hand Delivered Airbill #

Received for lab: Signed:

Special Instructions/Comments:

COE Data Deliverables

CTE Environmental Services
Alaska Division
Laboratory Data Report

Project: Bldg 986 FRA
Client: AGVIQ Inc.
CTE Work Order: 1027162
NPDL Work Order: NA

All quality assurance/quality control criteria is in compliance with the Alaska Department of Environmental Conservation (ADEC) and/or CTE's Assurance Program Plan.

Additional data is available from the laboratory should more information be required. Please contact the Quality Assurance Manager should any questions occur.

Prepared by (Signature) Eugene Alarmi
(Printed Name) Eugene A Laramie
(Date) 11/15/02

Reviewed by (Signature) Shane Poston
(Printed Name) SHANE POSTON
(Date) 11-18-02

AIR TOXICS LTD.

AN ENVIRONMENTAL ANALYTICAL LABORATORY

Air Toxics Ltd. Introduces the Electronic Report

Thank you for choosing Air Toxics Ltd. To better serve our customers, we are providing your report by e-mail. This document is provided in Portable Document Format which can be viewed with Acrobat Reader by Adobe.

This electronic report includes the following:

- Work order Summary;
- Laboratory Narrative;
- Results; and
- Chain of Custody (copy).

180 BLUE RAVINE ROAD, SUITE B FOLSOM, CA - 95630

(916) 985-1000 .FAX (916) 985-1020
Hours 8:00 A.M to 6:00 P.M. Pacific
E-mail to:samplereceiving@airtoxics.com

@ AIR TOXICS LTD.

AN ENVIRONMENTAL ANALYTICAL LABORATORY

WORK ORDER #: 0210731

Work Order Summary

CLIENT:	Ms. Rhonda Strucher CT & E 200 West Potter Anchorage, AK 99518	**BILL TO:**	Ms. Rhonda Strucher CT & E 200 West Potter Anchorage, AK 99518
PHONE:	907-562-2343	**P.O. #**	
FAX:	907-561-5301	***PROJECT #***	5020011
DATE RECEIVED:	10/31/02	**CONTACT:**	Karen Burden
DATE COMPLETED:	11/14/02		

FRACTION #	NAME	TEST	RECEIPT VAC./PRES.
01A	1027350001 (02FRA009AG)	Modified ASTM D-1945	0.0"Hg
02A	Lab Blank	Modified ASTM D-1945	NA
03A	LCS	Modified ASTM D-1945	NA

CERTIFIED BY: Linda A. Frumarc DATE: 11/14/02

Laboratory Director

Certfication numbers: CA NELAP - 02110CA, NY NELAP - 11291, UT NELAP - 9166389892,
LA NELAP/LELAP- AI 30763, AR DEQ
Name of Accrediting Agency: NELAP/Florida Department of Health, Scope of Application: Clean Air Act,
Accreditation number: E87680, Effective date: 07/01/02, Expiration date: 06/30/03
Air Toxics Ltd. certifies that the test results contained in this report meet all requirements of the NELAC standards

This report shall not be reproduced, except in full, without the written approval of Air Toxics Ltd.

180 BLUE RAVINE ROAD, SUITE B FOLSOM, CA - 95630
(916) 985-1000 . (800) 985-5955 . FAX (916) 985-1020

LABORATORY NARRATIVE
ASTM D-1945 Modified
CT & E
Workorder# 0210731

One High Pressure Sample Cylinder sample was received on October 31, 2002. The laboratory performed analysis via Modified ASTM Method D-1945 for Methane and fixed gases in air using GC/FID or GC/TCD. The method involves direct injection of up to 1.0 mL of sample. With the exception of analyses conducted in accordance with AFCEE 3.0, all reported compound quantifications were calculated from response factors derived from the first Continuing Calibration Verification of each relevant analytical batch. See the data sheets for the reporting limits for each compound.

Requirement	*ASTM D-1945*	*ATL Modifications*
Quantification based on average response factor in the Initial Calibration.	NELAC Standard 5.9.4.2.1(c)	With the exception of samples analyzed under AFCEE 3.0 protocol, all quantification based on the response factor derived from the first Continuing Calibration Verification of each relevant analytical batch.

Receiving Notes

There were no receiving discrepancies.

Analytical Notes

Since Nitrogen is used to pressurize samples, the reported Nitrogen values are calculated by adding all the sample components and subtracting from 100%.

Definition of Data Qualifying Flags

Seven qualifiers may have been used on the data analysis sheets and indicate as follows:
B - Compound present in laboratory blank greater than reporting limit.
J - Estimated value.
E - Exceeds instrument calibration range.
S - Saturated peak.
Q - Exceeds quality control limits.
U - Compound analyzed for but not detected above the detection limit.
M - Reported value may be biased due to apparent matrix interferences.

File extensions may have been used on the data analysis sheets and indicates as follows:
a-File was requantified
b-File was quantified by a second column and detector
r1-File was requantified for the purpose of reissue

AIR TOXICS LTD.

SAMPLE NAME: 1027350001 (02FRA009AG)

ID#: 0210731-01A

MODIFIED NATURAL GAS ANALYSIS BY ASTM D-1945

[redacted]

Compound	Rpt. Limit (%)	Amount (%)
Oxygen	0.20	17
Nitrogen	0.20	82
Methane	0.00020	Not Detected
Carbon Dioxide	0.0020	0.66

Container Type: High Pressure Sample Cylinder

AIR TOXICS LTD.

SAMPLE NAME: Lab Blank

ID#: 0210731-02A

MODIFIED NATURAL GAS ANALYSIS BY ASTM D-1945

Compound	Rpt. Limit (%)	Amount (%)
Oxygen	0.10	Not Detected
Nitrogen	0.10	Not Detected
Methane	0.00010	Not Detected
Carbon Dioxide	0.0010	Not Detected

Container Type: NA - Not Applicable

AIR TOXICS LTD.

SAMPLE NAME: LCS

ID#: 0210731-03A

MODIFIED NATURAL GAS ANALYSIS BY ASTM D-1945

[redacted]

Compound	Rpt. Limit (%)	%Recovery
Oxygen	0.10	91
Nitrogen	0.10	88
Methane	0.00010	95
Carbon Dioxide	0.0010	95

Container Type: NA - Not Applicable

1027350

AGVIQ ENVIRONMENTAL SERVICES
2121Abbott Rd. Suite 100
Anchorage, Alaska 99507
phone (907) 341-6299
fax (907) 341-6256

CHAIN OF CUSTODY/LABORATORY ANALYSIS REQUEST

Date 10/29/02 Page 1 of 1 Cooler # COC#

Client AGVIQ	Sample Conditions
Project Site: Bldg 986 FRA	Sampled by: PBD Seal #
Sampling Company: AGVIQ	Seal intact upon receipt by sampling company? Yes No
Sampling Site: RV System Exhaust	Condition of contents:
Project Manager: Darrin Lawless	Sealed for Shipping by:
Team Leader: Scott Waddell	Initial contents temp(C):
Project #: 58200 11	Sampling status: Continuing unit:
Receiving Lab: CT&E	Seal intact upon receipt by laboratory? Yes No
Address:	Contents temp upon receipt:
Purchase Order # DACA-85-01-P-0080	Condition of contents:

Date	Time	Location ID	Sample ID	Matrix	LabID	DRO AK102	GRO/BTEX AK101/EPA 8021B	Total Organic Carbon EPA 5310B	CH4, CO2, O2, N2 ASTM 1945	Grain Size Dist. ASTM D422	Number of Containers	Comments:
10/29/02	1042	Exhaust	02FRA009A6	Air					X		1	

Relinquished by:
Signature: P.D.
Printed Name: Paul B. Davis
Firm: AGVIQ Inc
Date/Time: 10/29/02 1115

Relinquished by:
Signature
Printed Name
Firm
Date/Time

Relinquished by:
Signature
Printed Name
Firm
Date/Time

Received by:
Signature: Scott Taylor
Printed Name: SCOTT TAYLOR
Firm: CT&E
Date/Time: 10/29/02 1115

Received by:
Signature
Printed Name
Firm
Date/Time

Received by:
Signature
Printed Name
Firm
Date/Time

Turnaround Time Required
___Standard (30 days)
___24 hr. ___48 hr.
___3-5 days ___7 days
___14 days ___days
Provide verbal preliminary results?
___Yes ___No
Provide FAX preliminary results? ___Yes ___No
Requested report date _____
EDF data required?
___Yes ___No

Shipping Details
Delivered to shipper by: AGVIQ
Method of shipment: Hand Delivered Airbill #
Received for lab: Signed:

Special Instructions/Comments:
COE Data Deliverables

CT&E Environmental Services Inc.

SAMPLE RECEI FORM

CT&E WO: 102735b

Yes	No		
	✓	Are samples **RUSH**, priority, or *within 72 hrs.* of hold time?	
		If yes have you done *e-mail notification*?	
	✓	Are samples *within 24 hrs.* of hold time or due date?	
		If yes, have you *spoken with* Supervisor?	
		Archiving bottles – if required, are they properly marked?	
	✓	Are there any **problems** (e.g., ids, analyses)?	
		Were samples preserved correctly and pH verified?	
		Has Project Manager been notified of problems?	
✓		Is this a DOD project? (USACE, Navy, AFCEE):	
		If yes, complete page 2 of Sample Receipt Form	
✓		Will a **data package** be required?	LEVEL II
	✓	If this is for PWS, provide **PWSID.**	
		Is there a **quote** for this project?	
	✓	Will **courier** charges apply?	
		Method of payment?	

Completed by (sign): Forest Taylor **(print):** FOREST TAYLOR

Login proof (check one): waived X required ____ performed by: ____

Notes: ____

Due Date: 11/13/02
Received Date/Time: 10/29/02 1115
Received Temperature*: AMBIENT
Thermometer ID: None

Cooler ID	Temp Blank	Cooler Temp

Matrix of each Sample:
4 " " #1
" " "
" " "
" " "
" " "
Trip Blank
BMS/BMSD

# of each Container Received:

____ 950 ml amber unpres'd	1 Other (specify) SS CYLINDER
____ 950 ml amber w / HCl	____ Other (specify) ____
____ 500 ml amber w / H_2SO_4	____ Other (specify) ____
____ 1L cubies unpres'd	____ Other (specify) ____
____ 1L Cubitainers w / HNO_3	
____ 1L Cubitainers w / H_2SO_4	
____ 1L Cubitainers w / NaOH + ZnAc	
____ 250 mL Nalgene NaOH	
____ 120 ml coli bottles	
____ 60 ml Nalgene unpres'd	
____ 60 mL Nalgene w/ H_2SO_4	
____ 8 oz amber unpres'd	
____ 4 oz amber unpres'd	
____ 4 oz w / septa w / MeOH	
____ 40 ml vials w / HCl	
____ 40 mL ascorbic acid + HCl	

Additional Sample Remarks

- ____ Extra Sample Volume?
- ____ Limited Sample Volume?
- ____ Field pres'd for volatiles?
- ____ Field-filtered for dissolved? ____
- ____ Lab-filtered for dissolved? ____
- ✓ Ref Lab required? ASTM 1945

TO BE COMPLETED IN ANCHORAGE UPON ARRIVAL FROM FAIRBANKS OR HAWAII.
NOTES RECORDED BELOW ARE ACTIONS NEEDED UPON ARRIVAL IN ANCHORAGE.

Notes: ____

DATE / TIME: ____

COOLER AND TEMP BLANK READINGS*

Cooler ID	Temp Blank	Cooler	Cooler ID	Temp Blank	Cooler

CUSTODY SEALS INTACT: YES / NO # / WHERE: ____

COMPLETED BY (INITIAL): ____

*Temperature readings include thermometer correction factors.

Form F004r06 (08/20/02)

CT&E Environmental Services Inc.

SAMPLE RECEIPT FORM

CT&E WO# 1027350

The following *must* be completed for *all* DOD projects (AFCEE, Navy, and USACE)

Yes	No		
	✓	Is received temperature 4 ± 2°C?	
		Exceptions:	Samples/Analyses affected: ALL
	✓	Rad Screen performed?	
		Result:	
	✓	Was there an airbill, etc.? Note #: HAND CARRIED	
	✓	Was cooler sealed with custody seals? Fax'd to COE?	
		# / where: NO COOLER	
N/A		Were seals intact upon arrival?	
✓		Was there a COC with cooler?	
✓		Was the COC filled out properly?	
✓		Did the COC indicate ACOE / AFCEE project? (if applicable)	
✓		Did the COC and samples correspond?	
	✓	Were all samples packed to prevent breakage?	
		packing material: NONE; SAMPLE IS STAINLESS STEEL AIR CYLINDER	
✓		Were all samples unbroken and clearly labeled?	
	✓	Were all samples sealed in separate plastic bags?	
N/A		Were all bottles for volatiles free of headspace?	
✓		Were correct container / sample sizes submitted?	
✓		Is sample condition good?	
		Was client notified of problems? (specify below)	

Individual contacted: _____

Date / Time: _____ Phone / Fax: _____

Completed by (sign): Forest Taylor (print): FOREST TAYLOR

Login proof (check one): waived X required ____ performed by: _____

F004Ar02 (08/08/02)

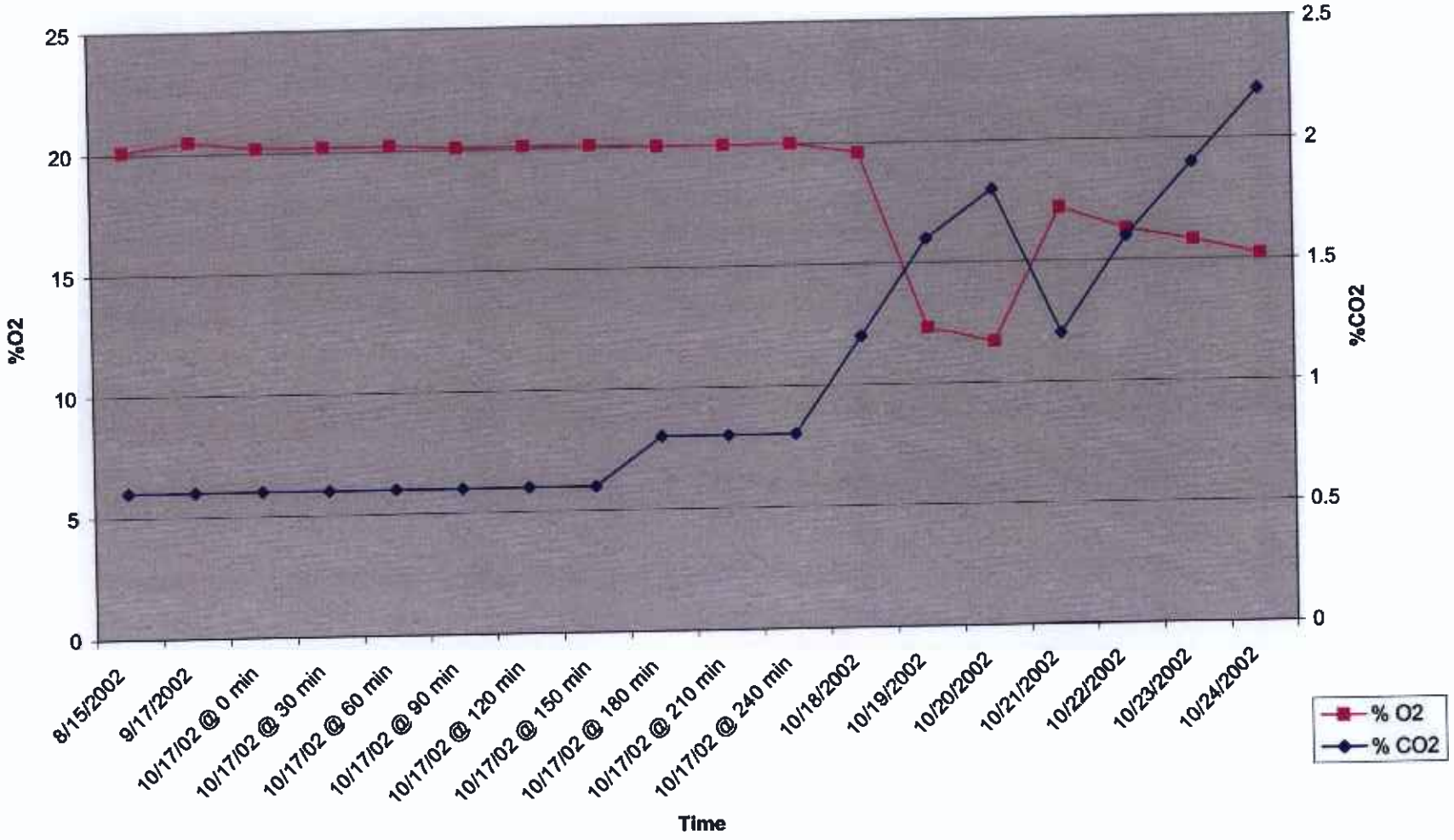
Appendix B

Combustible Gas Indicator Results From Quarterly Respirometer Test 4 of 5

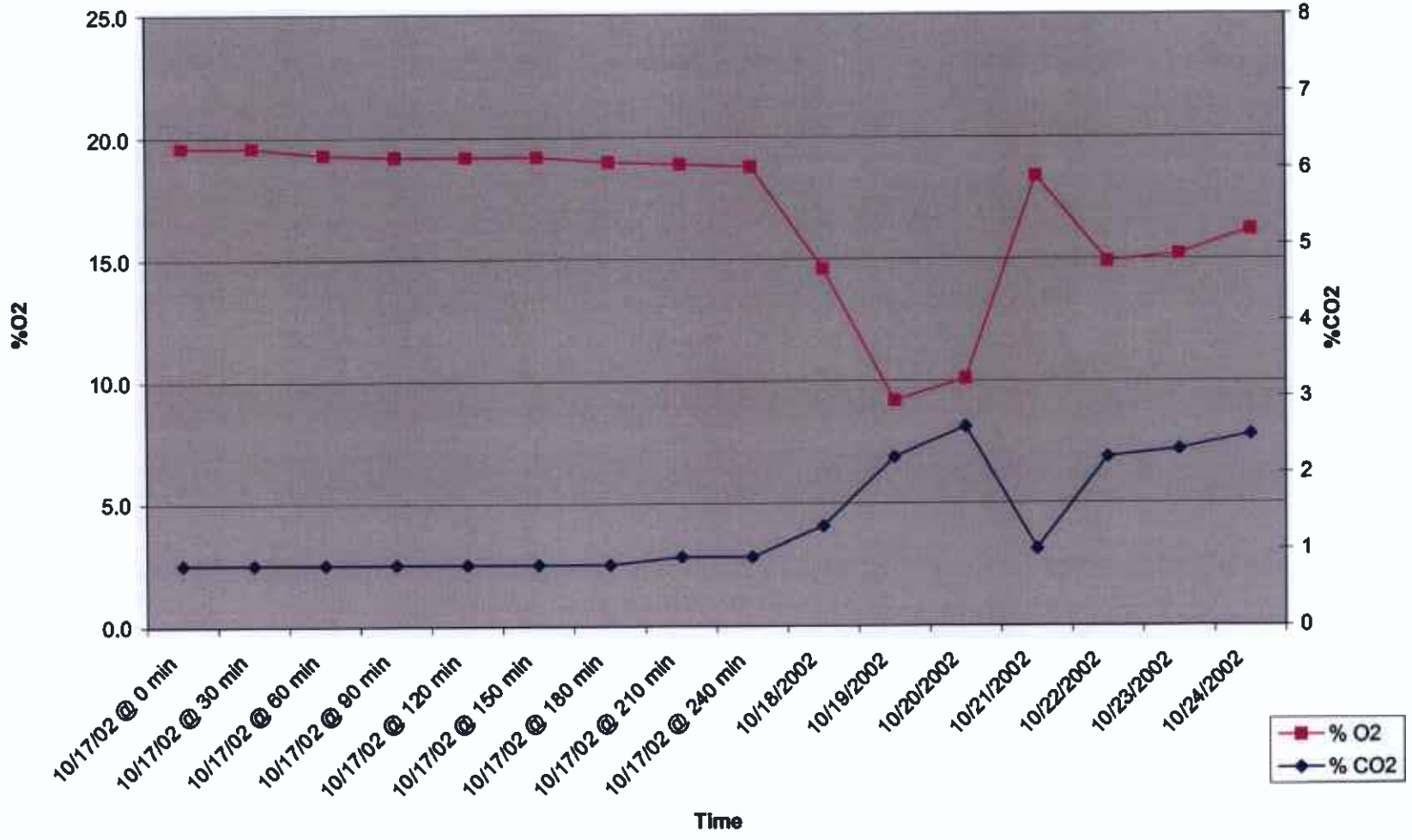
DATE	MP - 1				MP - 2				MP - 3			
	10 ft bgs (Blue)		20 ft bgs (Green)		10 ft bgs (Blue)		20 ft bgs (Green)		10 ft bgs (Blue)		20 ft bgs (Green)	
	% CO_2	% O_2	% CO_2	% O_2	% CO_2	% O_2	% CO_2	% O_2	% CO_2	% O_2	% CO_2	% O_2
8/15/2002	0.6	20.1	0.8	19.7	0.2	20.7	0.2	20.7	0.4	20.4	0.3	20.4
9/17/2002	0.6	20.5	0.8	19.7	0.2	20.8	0.3	20.7	0.4	20.7	0.6	20.4
10/17/02 @ 0 min	0.6	20.2	0.8	19.6	0.2	20.9	0.3	20.6	0.3	20.8	0.4	20.4
10/17/02 @ 30 min	0.6	20.2	0.8	19.6	0.2	20.9	0.3	20.6	0.3	20.8	0.4	20.4
10/17/02 @ 60 min	0.6	20.2	0.8	19.3	0.2	20.9	0.3	20.6	0.3	20.8	0.4	20.4
10/17/02 @ 90 min	0.6	20.1	0.8	19.2	0.2	20.9	0.4	20.3	0.3	20.7	0.4	20.4
10/17/02 @ 120 min	0.6	20.1	0.8	19.2	0.2	20.9	0.4	20.3	0.3	20.5	0.4	20.4
10/17/02 @ 150 min	0.6	20.1	0.8	19.2	0.2	20.9	0.4	20.3	0.3	20.5	0.4	20.4
10/17/02 @ 180 min	0.8	20.0	0.8	19.0	0.2	20.9	0.4	20.2	0.5	20.5	0.4	20.4
10/17/02 @ 210 min	0.8	20.0	0.9	18.9	0.2	20.8	0.5	20.0	0.4	20.4	0.4	20.4
10/17/02 @ 240 min	0.8	20.0	0.9	18.8	0.2	20.8	0.5	20.0	0.5	20.3	0.5	20.4
10/18/2002	1.2	19.6	1.3	14.6	0.2	20.8	0.9	17.3	0.6	18.1	0.8	20.0
10/19/2002	1.6	12.3	2.2	9.2	0.2	20.4	1.2	15.5	0.6	15.6	1.3	18.4
10/20/2002	1.8	11.7	2.6	10.1	0.2	19.0	1.8	14.3	0.8	15.3	1.2	18.1
10/21/2002	1.2	17.2	1.0	18.4	0.2	19.3	1.2	17.9	0.8	17.5	0.8	19.0
10/22/2002	1.6	16.3	2.2	14.9	0.2	19.2	1.8	16.3	0.6	20.0	0.8	19.3
10/23/2002	1.9	15.8	2.3	15.2	0.2	19.4	2.0	15.6	0.7	18.1	0.8	19.0
10/24/2002	2.2	15.2	2.5	16.2	0.2	19.3	2.3	14.7	0.6	18.6	0.8	18.9

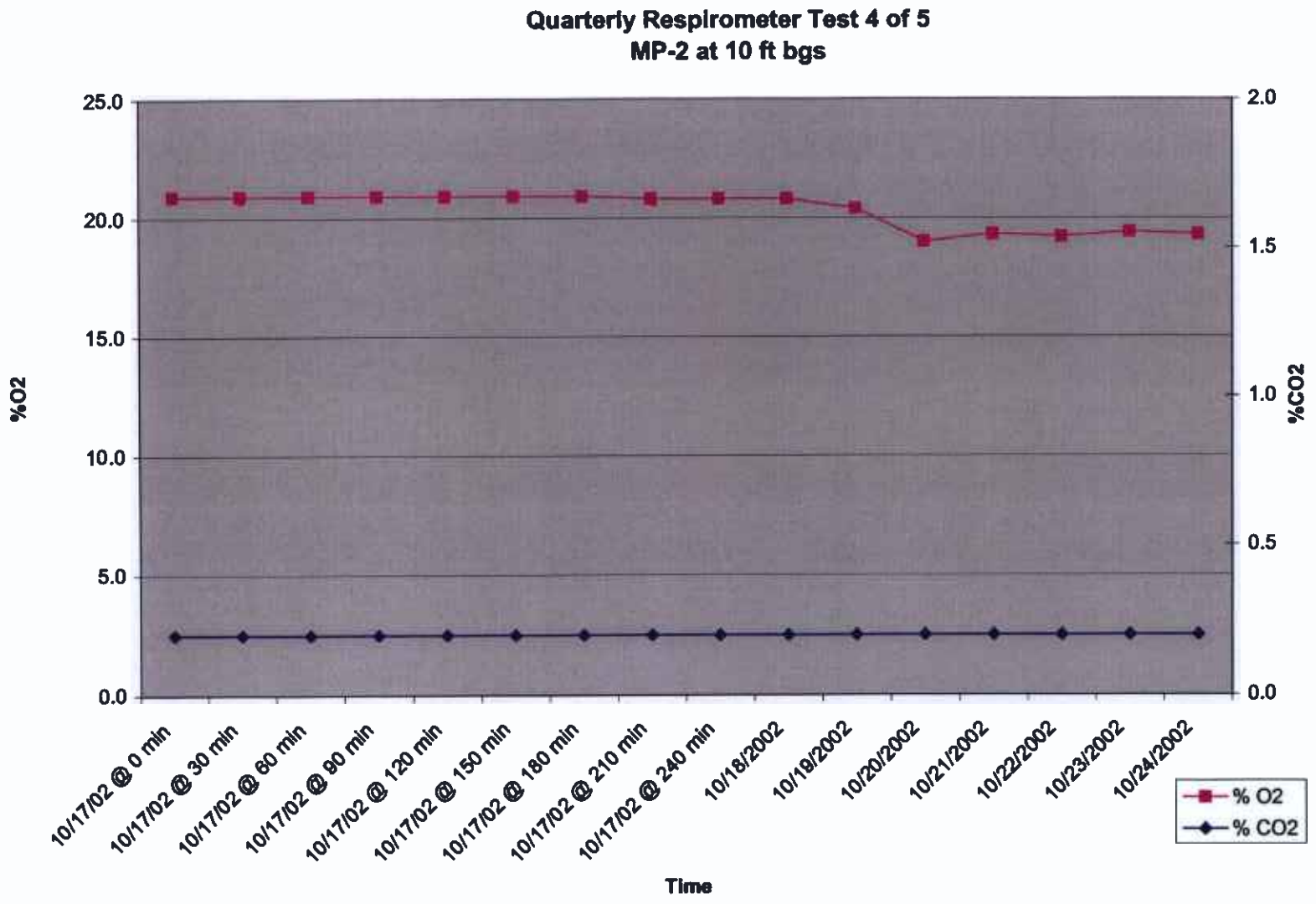
Note:
MP = monitoring point
ft = feet
bgs = below ground surface

Quarterly Respirometer Test 4 of 5
MP-1 at 10 ft bgs

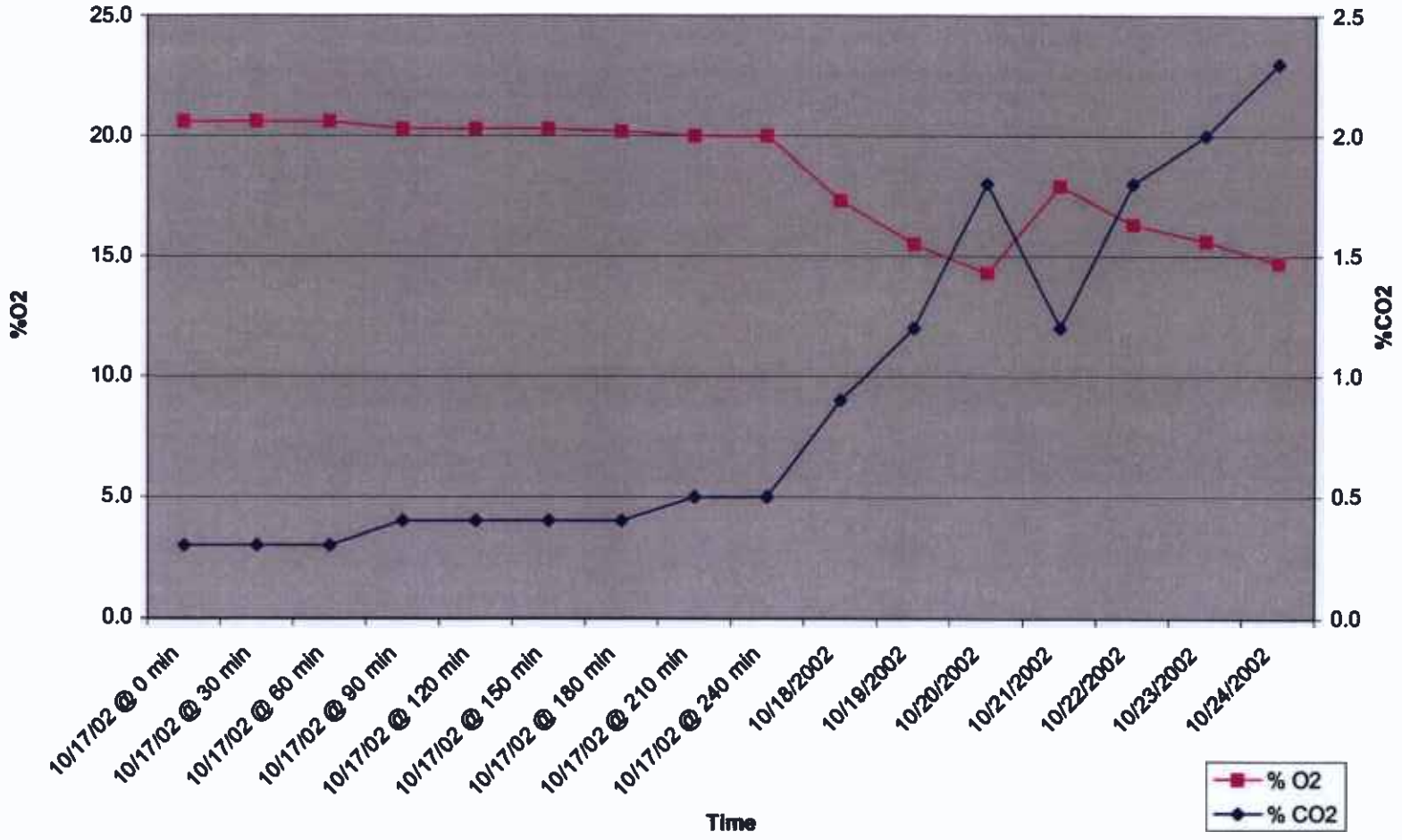


Quarterly Respirometer Test 4 of 5
MP-1 at 20 ft bgs

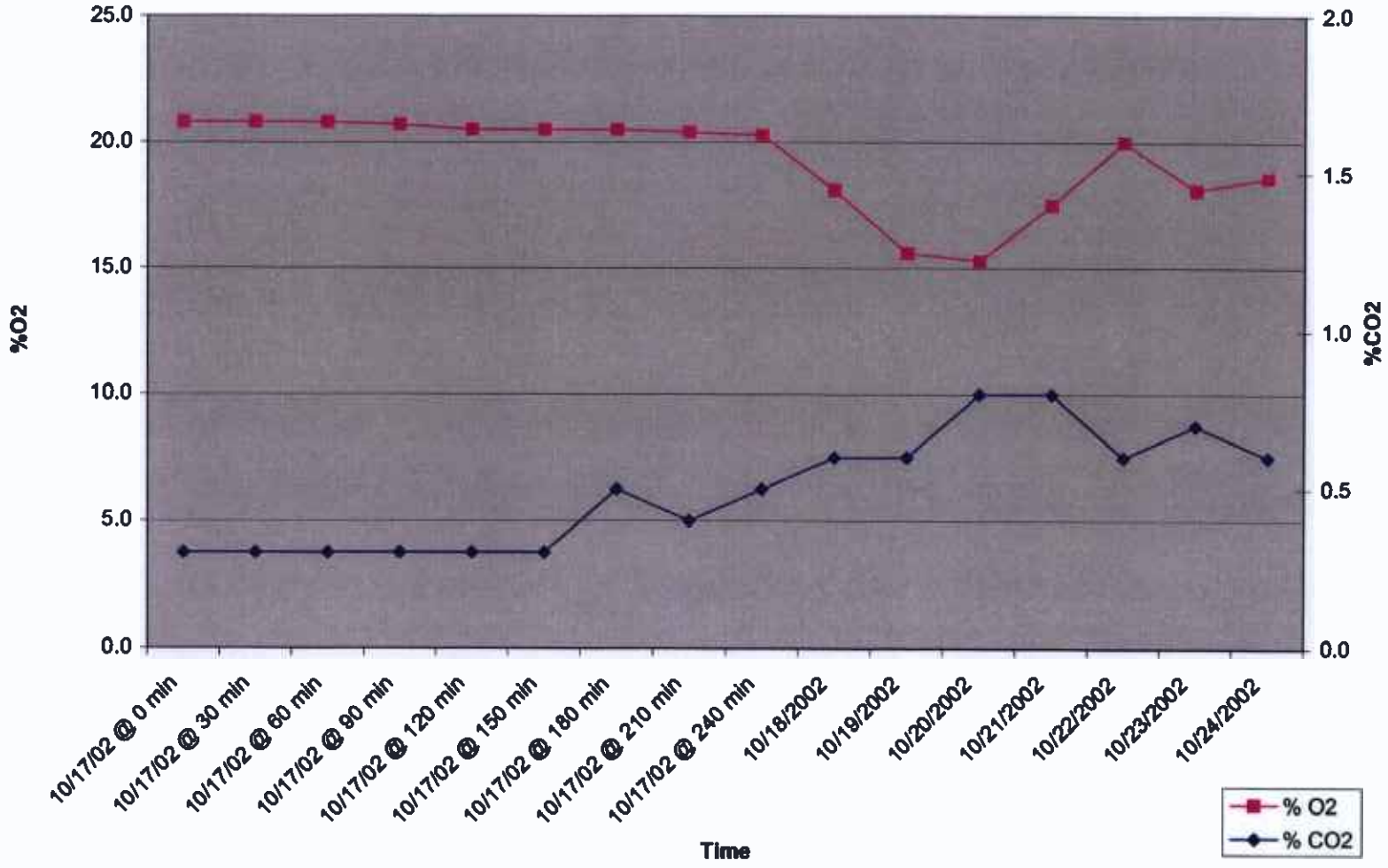



Quarterly Respirometer Test 4 of 5
MP-2 at 10 ft bgs
%O2
%CO2
25.0
20.0
15.0
10.0
5.0
0.0
2.0
1.5
1.0
0.5
0.0
10/17/02 @ 0 min
10/17/02 @ 30 min
10/17/02 @ 60 min
10/17/02 @ 90 min
10/17/02 @ 120 min
10/17/02 @ 150 min
10/17/02 @ 180 min
10/17/02 @ 210 min
10/17/02 @ 240 min
10/18/2002
10/19/2002
10/20/2002
10/21/2002
10/22/2002
10/23/2002
10/24/2002
% O2
% CO2
Time

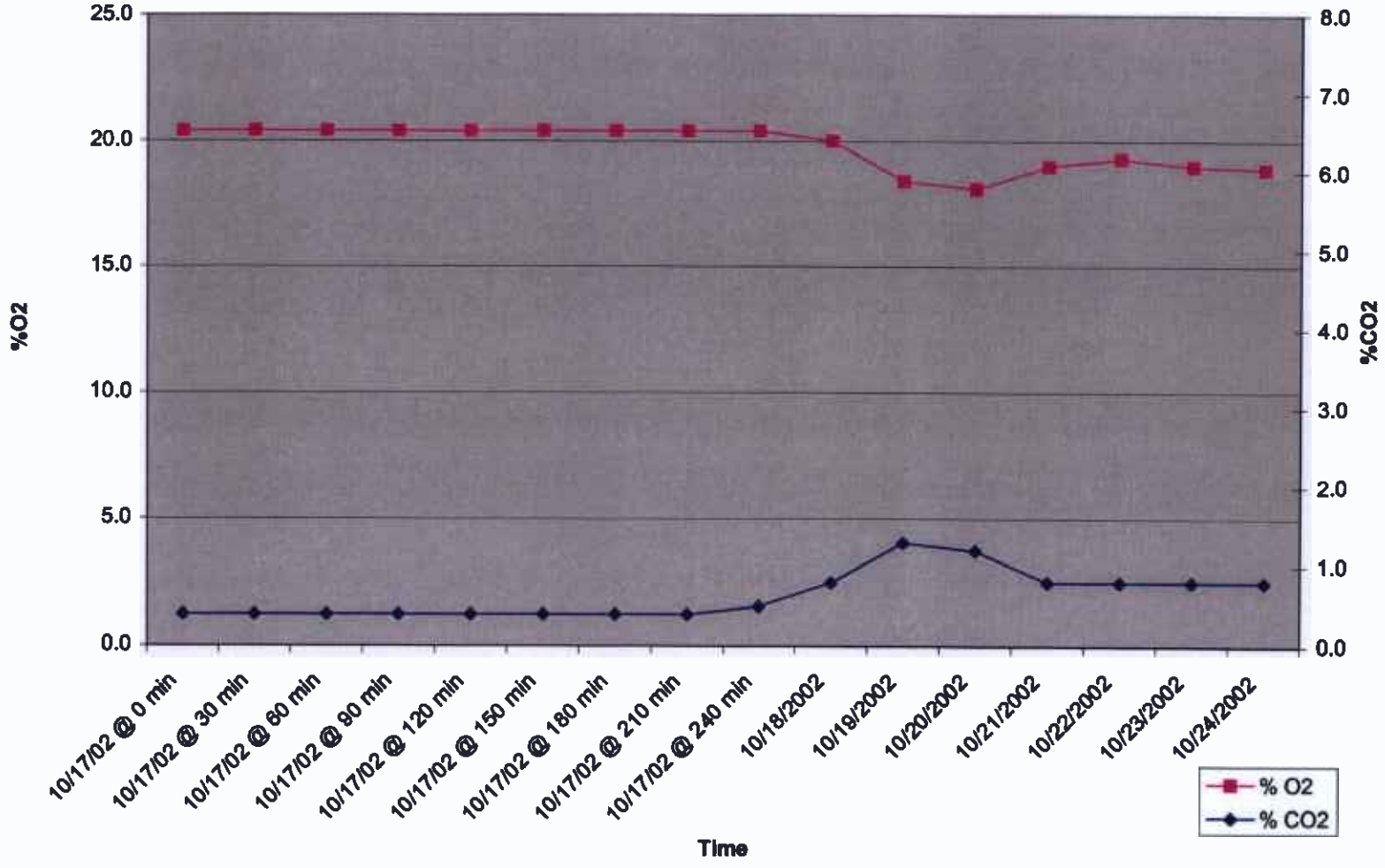
Quarterly Respirometer Test 4 of 5
MP-2 at 20 ft bgs



Quarterly Respirometer Test 4 of 5
MP-3 at 10 ft bgs

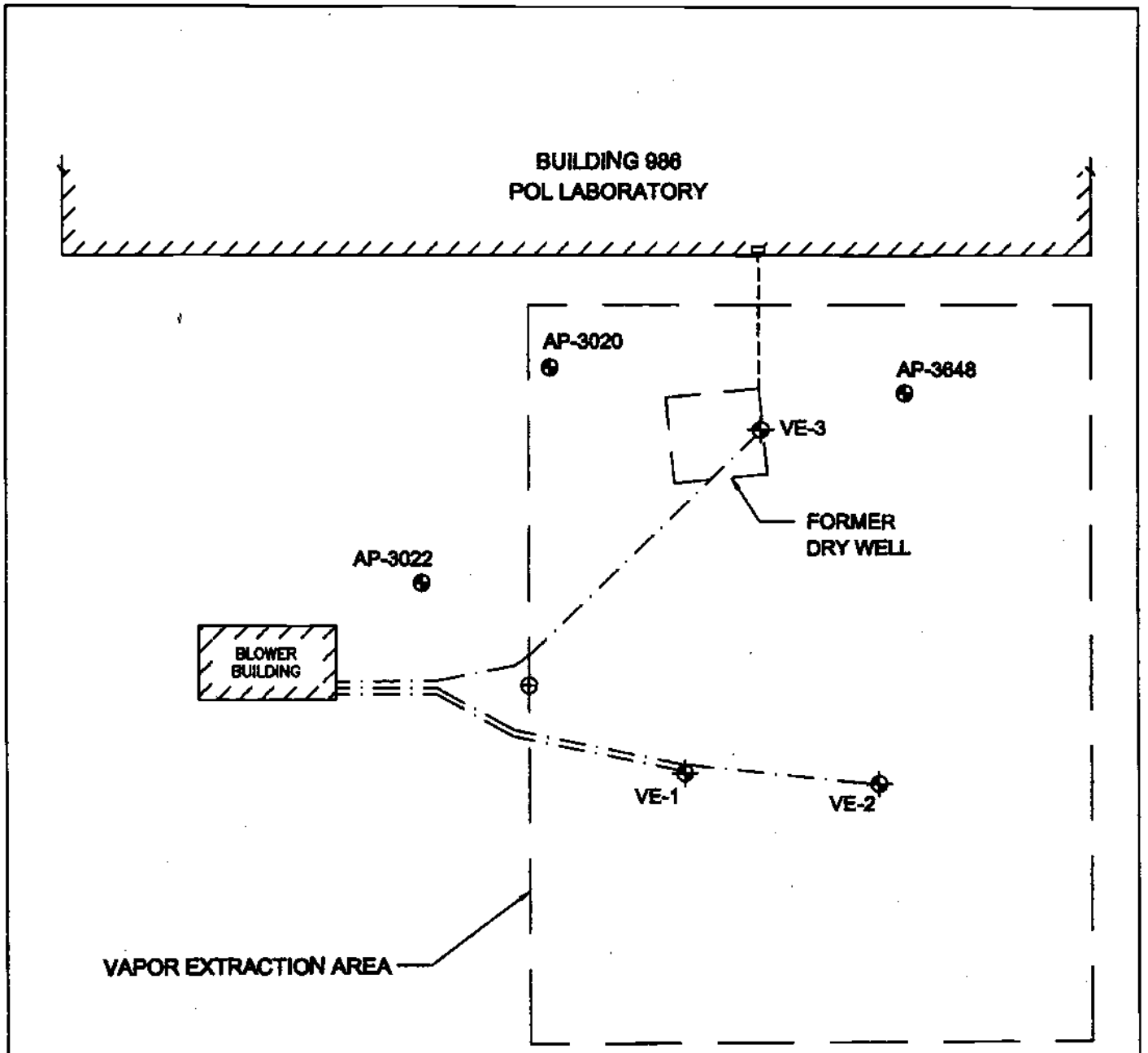


Quarterly Respirometer Test 4 of 5
MP-3 at 20 ft bgs



Appendix C

Site map



2101 Abbott Road, Anchorage, Alaska 99507-4100	DATE DEC. 2001 DWN. TWS CKD. DML REV. 1 CONTRACT No. DACA85-01-P-0080	FORT RICHARDSON, ALASKA BUILDING 986 OPERATION & MAINTENANCE SITE LAYOUT MAP	FIGURE 2

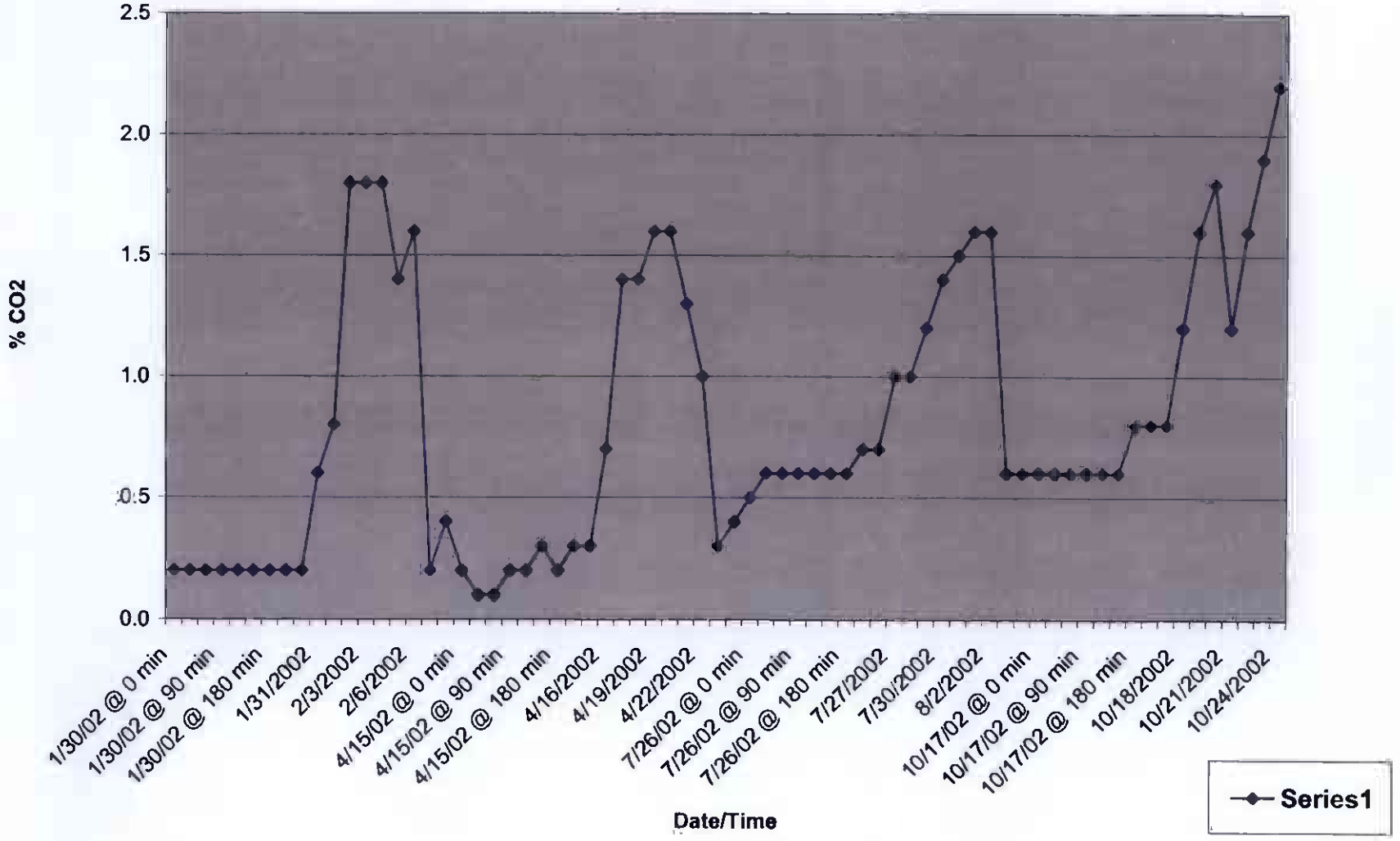
Appendix D

Carbon Dioxide Comparison

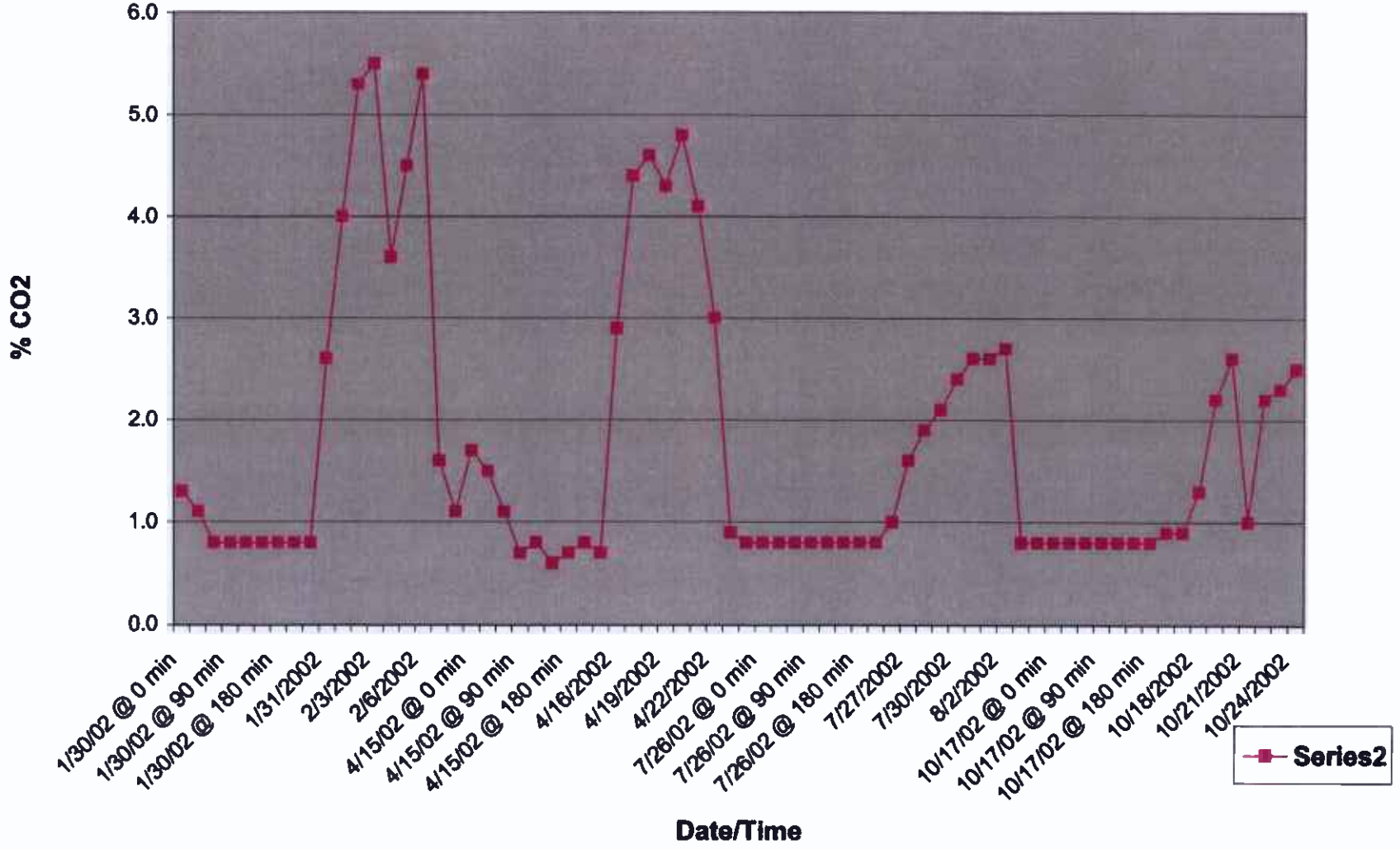
Carbon Dioxide Comparison						
	MP - 1		MP - 2		MP - 3	
DATE	10 ft bgs (Blue)	20 ft bgs (Green)	10 ft bgs (Blue)	20 ft bgs (Green)	10 ft bgs (Blue)	20 ft bgs (Green)
	% CO_2	% CO_2	% CO_2	%CO_2	% CO_2	% CO_2
1/30/02 @ 0 min	0.2	1.3	0.0	0.6	0.0	0.1
1/30/02 @ 30 min	0.2	1.1	0.0	0.6	0.0	0.0
1/30/02 @ 60 min	0.2	0.8	0.0	0.6	0.0	0.0
1/30/02 @ 90 min	0.2	0.8	0.0	0.8	0.0	0.2
1/30/02 @ 120 min	0.2	0.8	0.0	0.8	0.0	0.1
1/30/02 @ 150 min	0.2	0.8	0.0	0.8	0.0	0.1
1/30/02 @ 180 min	0.2	0.8	0.0	1.0	0.0	0.1
1/30/02 @ 210 min	0.2	0.8	0.0	1.2	0.0	0.2
1/30/02 @ 240 min	0.2	0.8	0.0	1.4	0.0	0.2
1/31/2002	0.6	2.6	0.2	3.0	0.2	0.2
2/1/2002	0.8	4.0	0.0	3.6	0.0	0.2
2/2/2002	1.8	5.3	0.2	3.7	0.0	0.4
2/3/2002	1.8	5.5	0.1	4.8	0.0	0.4
2/4/2002	1.8	3.6	0.1	5.0	0.2	0.5
2/5/2002	1.4	4.5	0.2	5.6	0.1	0.4
2/6/2002	1.6	5.4	0.1	6.8	0.2	0.4
2/28/2002	0.2	1.6	0.0	0.4	0.0	0.0
3/28/2002	0.4	1.1	0.0	0.4	0.0	0.1
4/15/02 @ 0 min	0.2	1.7	0.0	0.4	0.0	0.0
4/15/02 @ 30 min	0.1	1.5	0.0	0.4	0.0	0.0
4/15/02 @ 60 min	0.1	1.1	0.0	0.6	0.0	0.0
4/15/02 @ 90 min	0.2	0.7	0.0	0.6	0.0	0.1
4/15/02 @ 120 min	0.2	0.8	0.0	0.6	0.0	0.2
4/15/02 @ 150 min	0.3	0.6	0.0	0.7	0.0	0.1
4/15/02 @ 180 min	0.2	0.7	0.0	0.8	0.0	0.2
4/15/02 @ 210 min	0.3	0.8	0.0	1.0	0.0	0.2
4/15/02 @ 240 min	0.3	0.7	0.0	1.2	0.0	0.2
4/16/2002	0.7	2.9	0.0	2.7	0.0	0.3
4/17/2002	1.4	4.4	0.2	3.4	0.0	0.3
4/18/2002	1.4	4.6	0.1	4.2	0.0	0.4
4/19/2002	1.6	4.3	0.0	3.8	0.1	0.3
4/20/2002	1.6	4.8	0.0	3.0	0.0	0.2
4/21/2002	1.3	4.1	0.1	3.5	0.0	0.4
4/22/2002	1.0	3.0	0.0	3.8	0.0	0.2
5/15/2002	0.3	0.9	0.1	0.2	0.1	0.0
6/12/2002	0.4	0.8	0.2	0.4	0.4	0.2

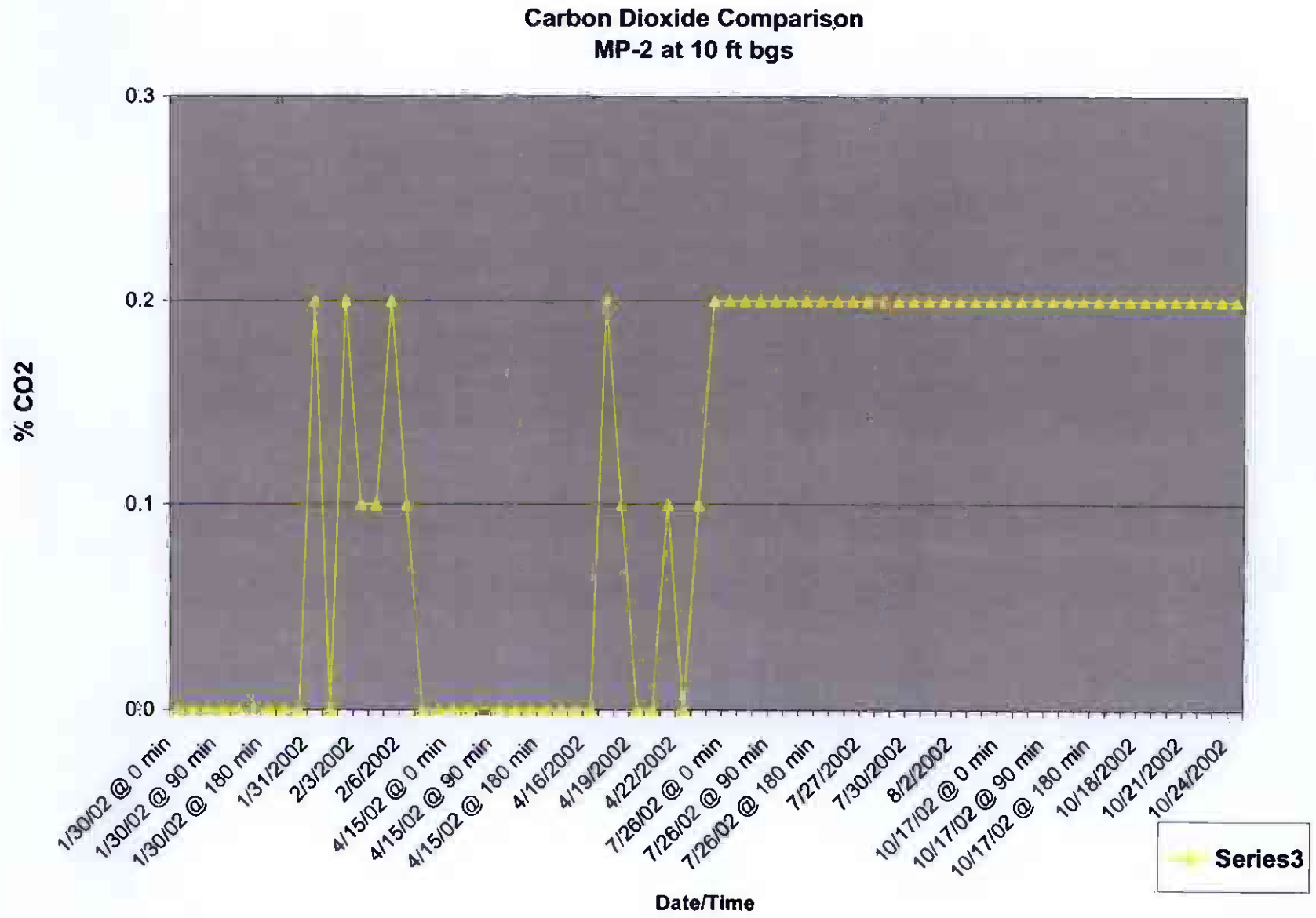
7/26/02 @ 0 min	0.5	0.8	0.2	0.3	0.0	0.2
7/26/02 @ 30 min	0.6	0.8	0.2	0.4	0.2	0.2
7/26/02 @ 60 min	0.6	0.8	0.2	0.4	0.2	0.2
7/26/02 @ 90 min	0.6	0.8	0.2	0.4	0.2	0.2
7/26/02 @ 120 min	0.6	0.8	0.2	0.4	0.2	0.2
7/26/02 @ 150 min	0.6	0.8	0.2	0.4	0.2	0.2
7/26/02 @ 180 min	0.6	0.8	0.2	0.5	0.1	0.2
7/26/02 @ 210 min	0.7	0.8	0.2	0.5	0.2	0.2
7/26/02 @ 240 min	0.7	1.0	0.2	0.5	0.2	0.2
7/27/2002	1.0	1.6	0.2	0.6	0.2	0.3
7/28/2002	1.0	1.9	0.2	0.6	0.2	0.2
7/29/2002	1.2	2.1	0.2	0.8	0.2	0.2
7/30/2002	1.4	2.4	0.2	1.0	0.4	0.2
7/31/2002	1.5	2.6	0.2	1.3	0.4	0.2
8/1/2002	1.6	2.6	0.2	1.5	0.4	0.2
8/2/2002	1.6	2.7	0.2	1.6	0.4	0.2
8/15/2002	0.6	0.8	0.2	0.2	0.4	0.3
9/17/2002	0.6	0.8	0.2	0.3	0.4	0.6
10/17/02 @ 0 min	0.6	0.8	0.2	0.3	0.3	0.4
10/17/02 @ 30 min	0.6	0.8	0.2	0.3	0.3	0.4
10/17/02 @ 60 min	0.6	0.8	0.2	0.3	0.3	0.4
10/17/02 @ 90 min	0.6	0.8	0.2	0.4	0.3	0.4
10/17/02 @ 120 min	0.6	0.8	0.2	0.4	0.3	0.4
10/17/02 @ 150 min	0.6	0.8	0.2	0.4	0.3	0.4
10/17/02 @ 180 min	0.8	0.8	0.2	0.4	0.5	0.4
10/17/02 @ 210 min	0.8	0.9	0.2	0.5	0.4	0.4
10/17/02 @ 240 min	0.8	0.9	0.2	0.5	0.5	0.5
10/18/2002	1.2	1.3	0.2	0.9	0.6	0.8
10/19/2002	1.6	2.2	0.2	1.2	0.6	1.3
10/20/2002	1.8	2.6	0.2	1.8	0.8	1.2
10/21/2002	1.2	1.0	0.2	1.2	0.8	0.8
10/22/2002	1.6	2.2	0.2	1.8	0.6	0.8
10/23/2002	1.9	2.3	0.2	2.0	0.7	0.8
10/24/2002	2.2	2.5	0.2	2.3	0.6	0.8

Carbon Dioxide Comparison
MP-1 at 10 ft bgs

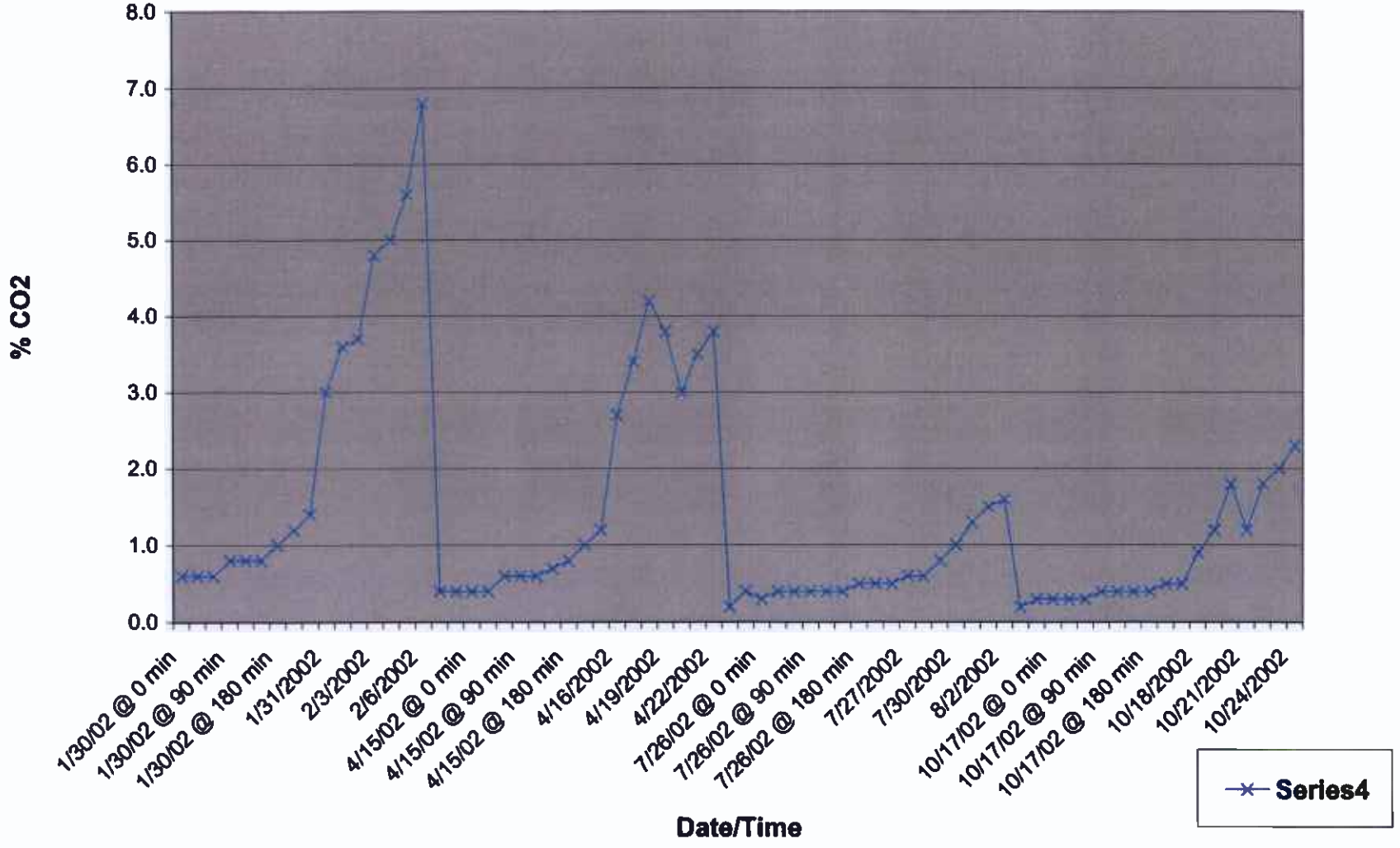


Carbon Dioxide Comparison
MP-1 at 20 ft bgs

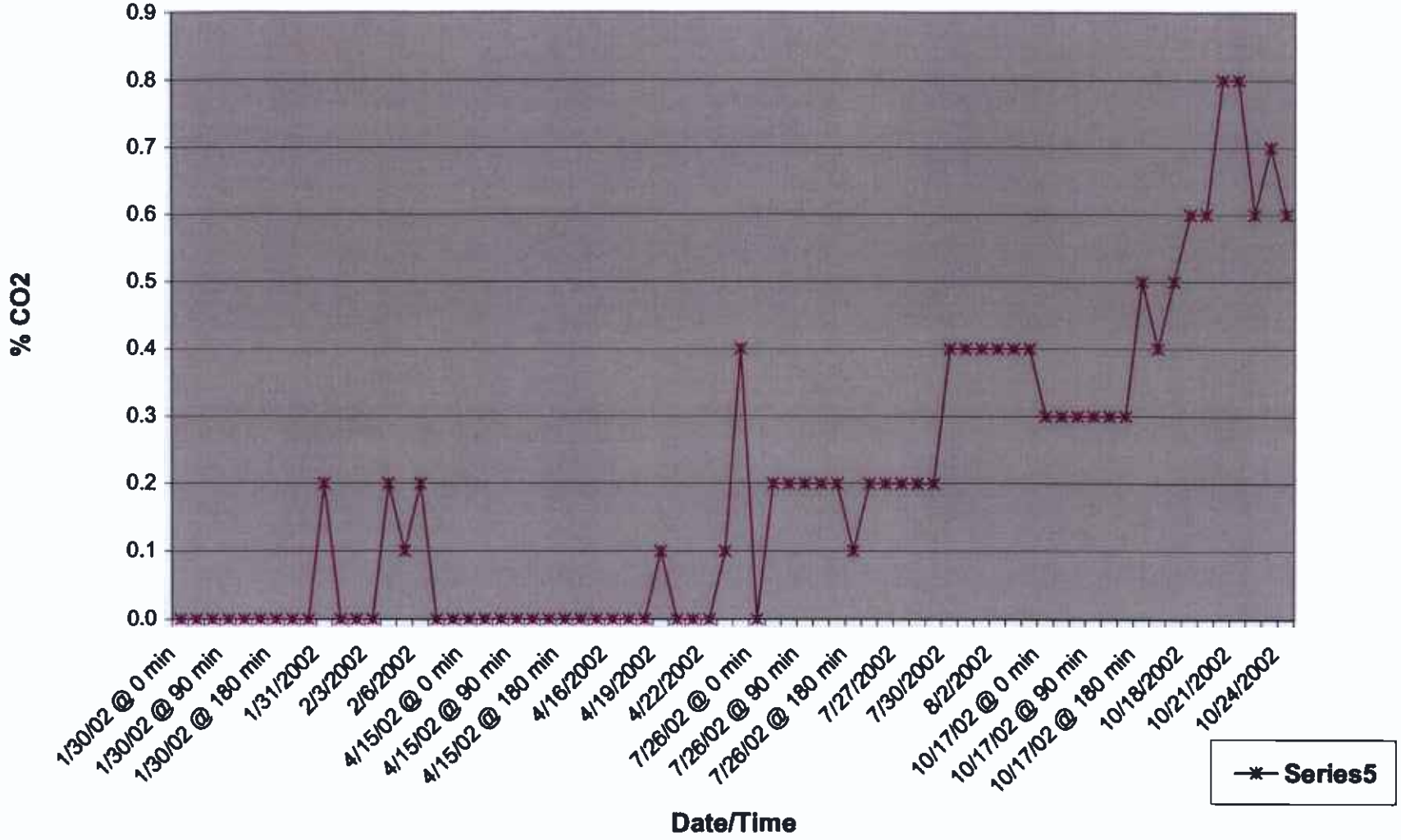



Carbon Dioxide Comparison
MP-2 at 10 ft bgs
% CO2
0.3
0.2
0.1
0.0
1/30/02 @ 0 min
1/30/02 @ 90 min
1/30/02 @ 180 min
1/31/2002
2/3/2002
2/6/2002
4/15/02 @ 0 min
4/15/02 @ 90 min
4/15/02 @ 180 min
4/16/2002
4/19/2002
4/22/2002
7/26/02 @ 0 min
7/26/02 @ 90 min
7/26/02 @ 180 min
7/27/2002
7/30/2002
8/2/2002
10/17/02 @ 0 min
10/17/02 @ 90 min
10/17/02 @ 180 min
10/18/2002
10/21/2002
10/24/2002
Series3
Date/Time

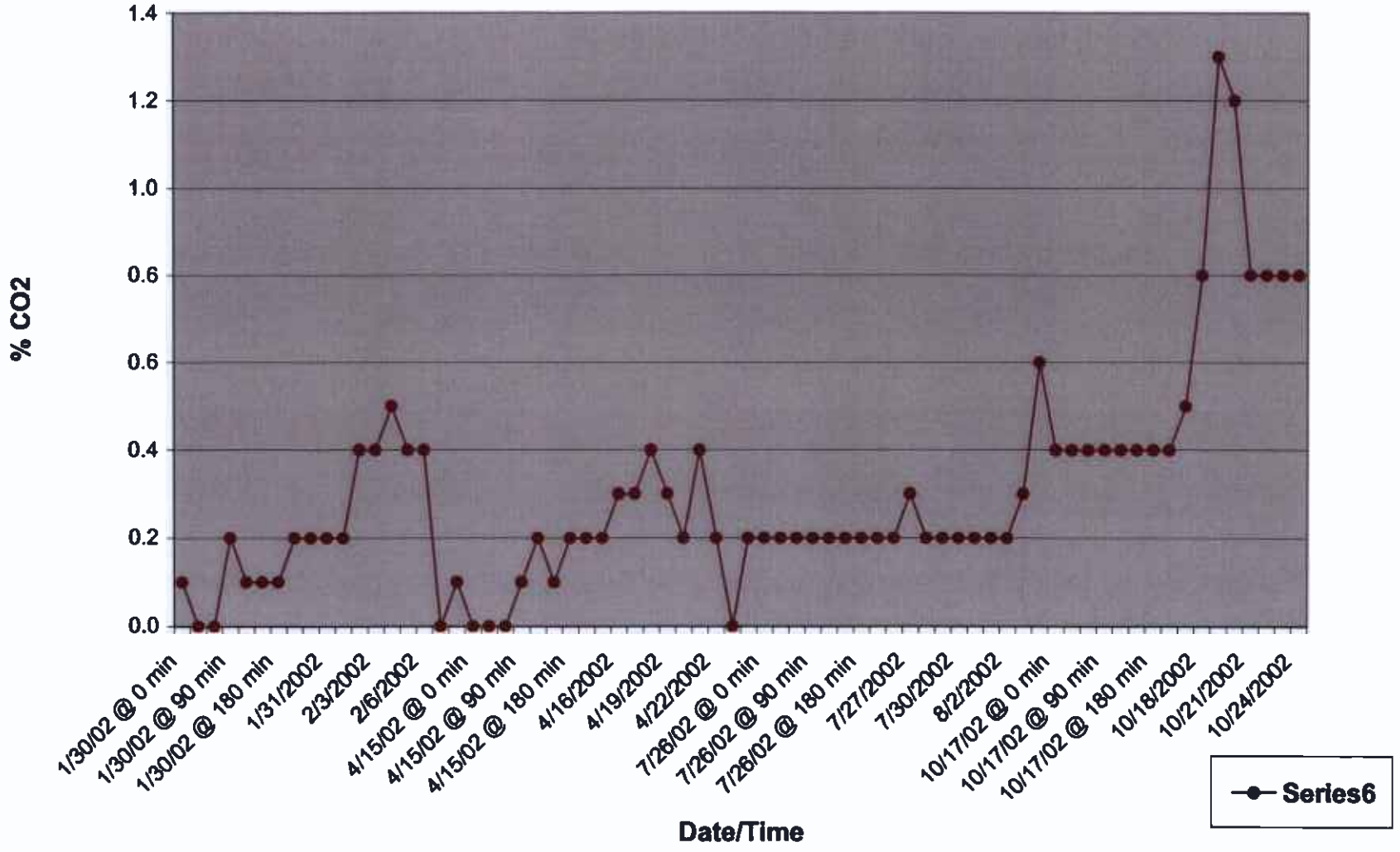
Carbon Dioxide Comparison
MP-2 at 20 ft bgs



Carbon Dioxide Comparison
MP-3 at 10 ft bgs



Carbon Dioxide Comparison
MP-3 at 20 ft bgs

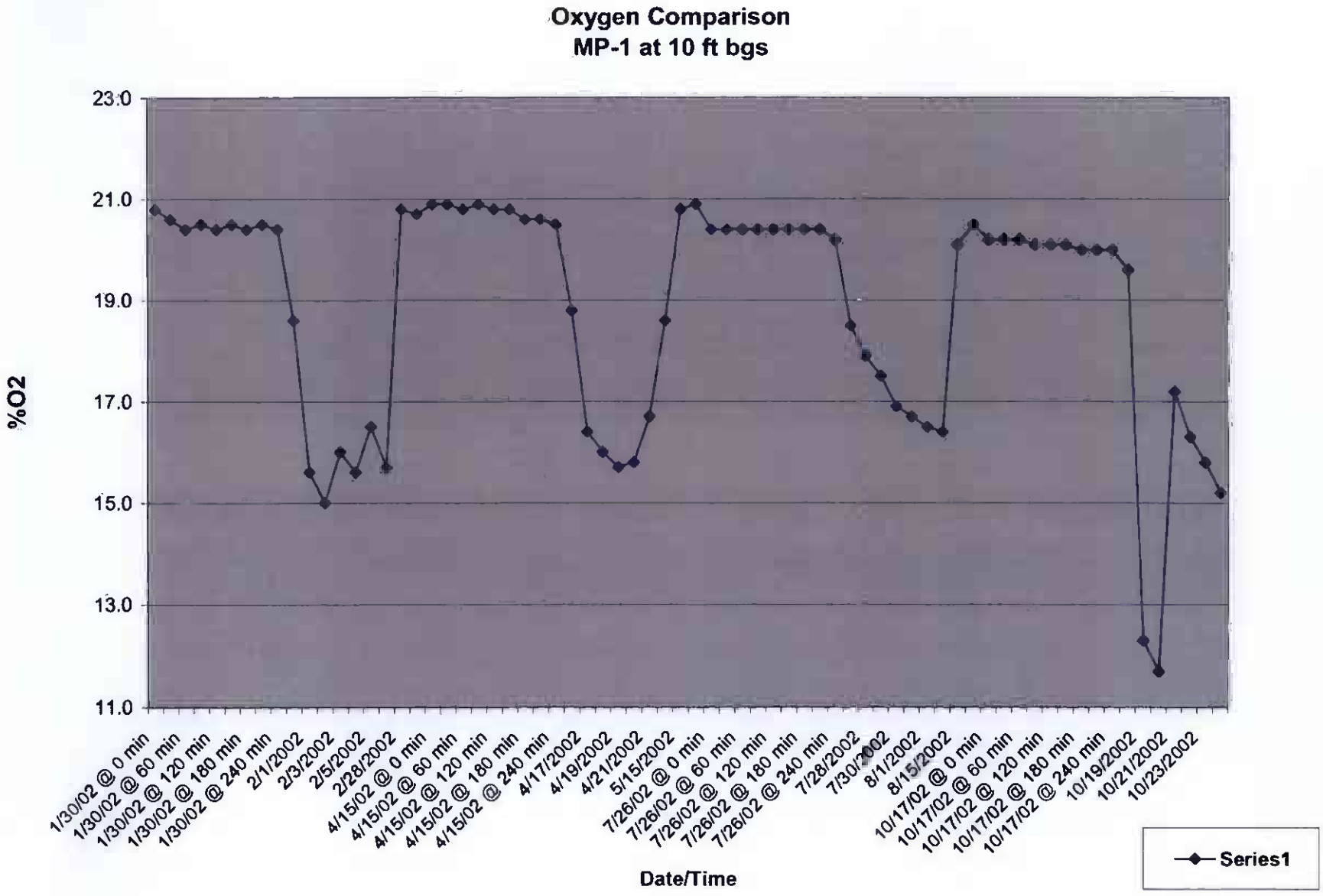


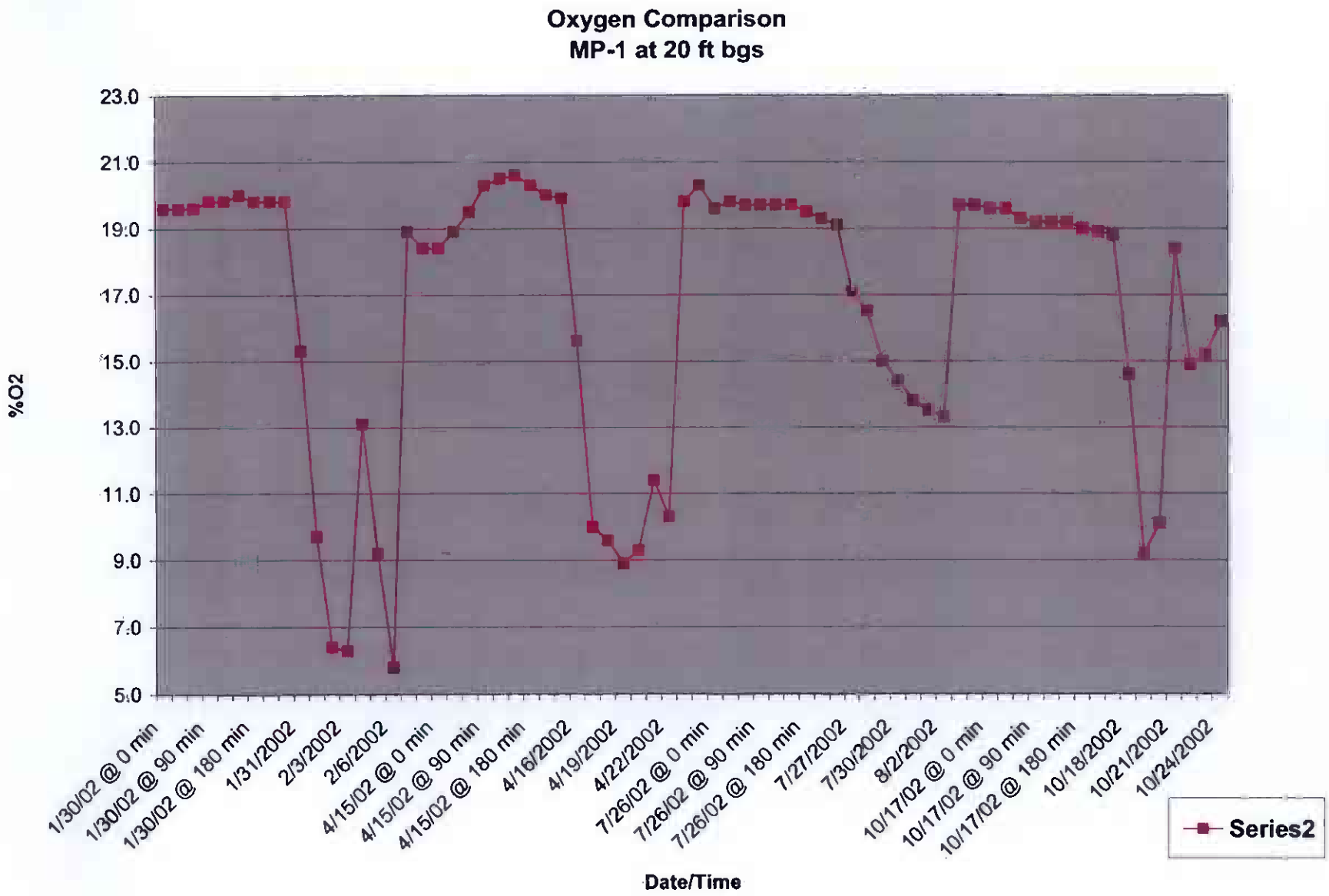
Appendix E

Oxygen Comparison

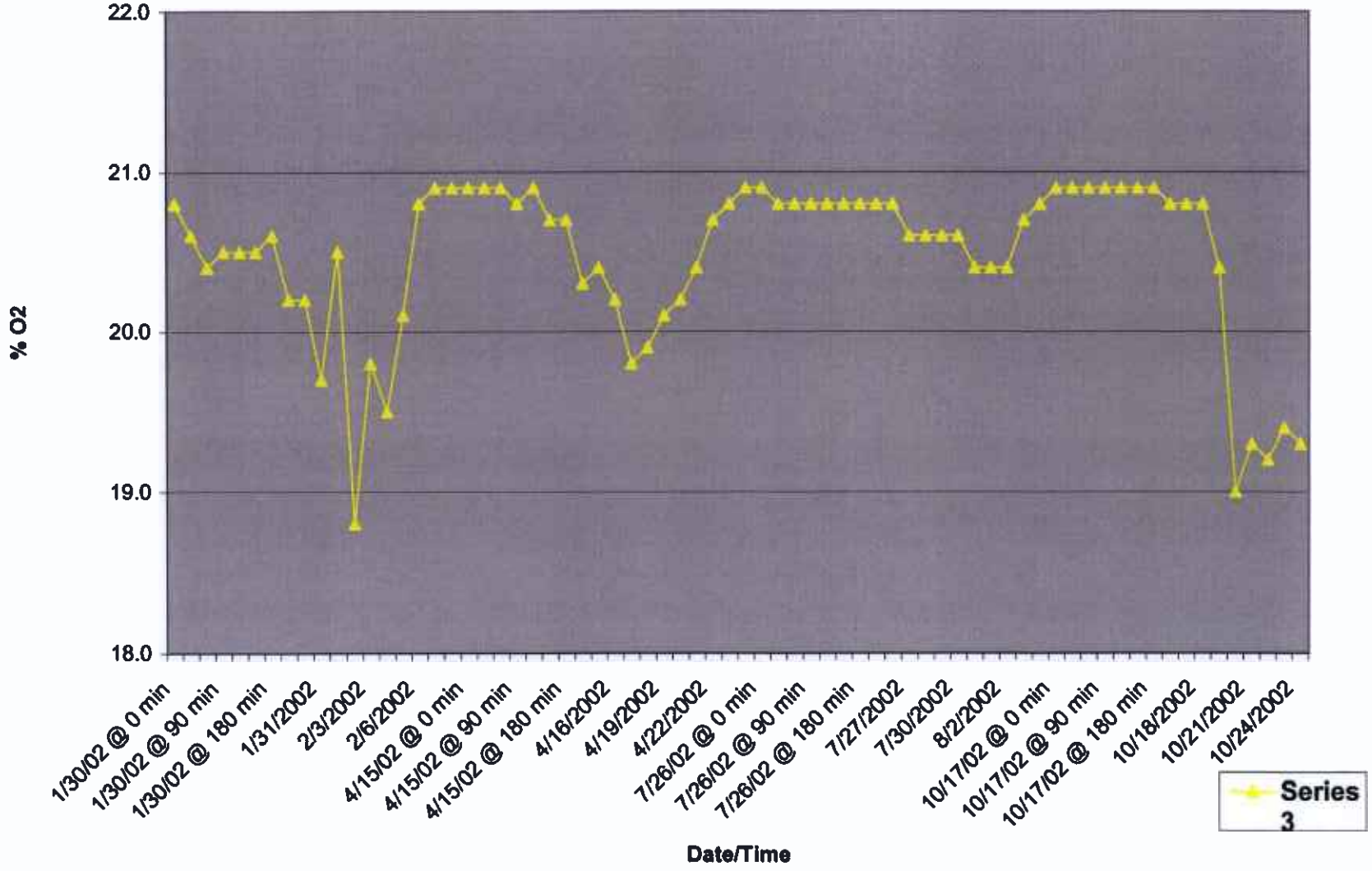
Oxygen Comparison						
	MP - 1		MP - 2		MP - 3	
DATE	10 ft bgs (Blue)	20 ft bgs (Green)	10 ft bgs (Blue)	20 ft bgs (Green)	10 ft bgs (Blue)	20 ft bgs (Green)
	% O2	% O2	% O2	% O2	% O2	% O2
1/30/02 @ 0 min	20.8	19.6	20.8	20.2	20.9	20.9
1/30/02 @ 30 min	20.6	19.6	20.6	20.1	20.7	20.7
1/30/02 @ 60 min	20.4	19.6	20.4	19.8	20.7	20.6
1/30/02 @ 90 min	20.5	19.8	20.5	19.7	20.8	20.7
1/30/02 @ 120 min	20.4	19.8	20.5	19.5	20.8	20.7
1/30/02 @ 150 min	20.5	20.0	20.5	19.3	20.8	20.7
1/30/02 @ 180 min	20.4	19.8	20.6	19.2	20.8	20.7
1/30/02 @ 210 min	20.5	19.8	20.2	18.9	20.9	20.6
1/30/02 @ 240 min	20.4	19.8	20.2	18.4	20.7	20.5
1/31/2002	18.6	15.3	19.7	13.5	20.9	20.9
2/1/2002	15.6	9.7	20.5	9.0	20.2	18.9
2/2/2002	15.0	6.4	18.8	7.2	19.6	19.8
2/3/2002	16.0	6.3	19.8	6.2	20.9	20.7
2/4/2002	15.6	13.1	19.5	9.0	20.3	19.7
2/5/2002	16.5	9.2	20.1	8.2	20.4	19.3
2/6/2002	15.7	5.8	20.8	5.4	20.9	20.4
2/28/2002	20.8	18.9	20.9	20.7	20.9	20.9
3/28/2002	20.7	18.4	20.9	20.4	20.9	20.9
4/15/02 @ 0 min	20.9	18.4	20.9	20.4	20.9	20.9
4/15/02 @ 30 min	20.9	18.9	20.9	20.3	20.9	20.9
4/15/02 @ 60 min	20.8	19.5	20.9	20.3	20.9	20.9
4/15/02 @ 90 min	20.9	20.3	20.8	20.1	20.8	20.9
4/15/02 @ 120 min	20.8	20.5	20.9	19.8	20.8	20.9
4/15/02 @ 150 min	20.8	20.6	20.7	19.6	20.8	20.8
4/15/02 @ 180 min	20.6	20.3	20.7	19.5	20.7	20.6
4/15/02 @ 210 min	20.6	20.0	20.3	19.3	20.8	20.7
4/15/02 @ 240 min	20.5	19.9	20.4	19.0	20.8	20.6
4/16/2002	18.8	15.6	20.2	13.0	20.8	20.0
4/17/2002	16.4	10.0	19.8	9.6	20.7	19.7
4/18/2002	16.0	9.6	19.9	8.5	20.8	19.6
4/19/2002	15.7	8.9	20.1	7.9	20.7	20.1
4/20/2002	15.8	9.3	20.2	7.6	20.8	20.7
4/21/2002	16.7	11.4	20.4	7.7	20.6	19.9
4/22/2002	18.6	10.3	20.7	8.3	20.9	20.2
5/15/2002	20.8	19.8	20.8	20.7	20.8	20.9
6/12/2002	20.9	20.3	20.9	20.9	20.9	20.8

7/26/02 @ 0 min	20.4	19.6	20.9	20.5	20.9	20.6
7/26/02 @ 30 min	20.4	19.8	20.8	20.4	20.7	20.7
7/26/02 @ 60 min	20.4	19.7	20.8	20.3	20.8	20.6
7/26/02 @ 90 min	20.4	19.7	20.8	20.3	20.8	20.7
7/26/02 @ 120 min	20.4	19.7	20.8	20.0	20.8	20.7
7/26/02 @ 150 min	20.4	19.7	20.8	19.8	20.7	20.6
7/26/02 @ 180 min	20.4	19.5	20.8	19.8	20.7	20.6
7/26/02 @ 210 min	20.4	19.3	20.8	19.8	20.7	20.6
7/26/02 @ 240 min	20.2	19.1	20.8	19.7	20.7	20.6
7/27/2002	18.5	17.1	20.6	17.0	20.5	20.4
7/28/2002	17.9	16.5	20.6	16.6	20.6	20.2
7/29/2002	17.5	15.0	20.6	15.9	20.5	20.0
7/30/2002	16.9	14.4	20.6	15.6	20.4	20.1
7/31/2002	16.7	13.8	20.4	14.0	20.2	20.0
8/1/2002	16.5	13.5	20.4	13.9	20.2	20.0
8/2/2002	16.4	13.3	20.4	13.9	20.2	20.0
8/15/2002	20.1	19.7	20.7	20.7	20.4	20.4
9/17/2002	20.5	19.7	20.8	20.7	20.7	20.4
10/17/02 @ 0 min	20.2	19.6	20.9	20.6	20.8	20.4
10/17/02 @ 30 min	20.2	19.6	20.9	20.6	20.8	20.4
10/17/02 @ 60 min	20.2	19.3	20.9	20.6	20.8	20.4
10/17/02 @ 90 min	20.1	19.2	20.9	20.3	20.7	20.4
10/17/02 @ 120 min	20.1	19.2	20.9	20.3	20.5	20.4
10/17/02 @ 150 min	20.1	19.2	20.9	20.3	20.5	20.4
10/17/02 @ 180 min	20.0	19.0	20.9	20.2	20.5	20.4
10/17/02 @ 210 min	20.0	18.9	20.8	20.0	20.4	20.4
10/17/02 @ 240 min	20.0	18.8	20.8	20.0	20.3	20.4
10/18/2002	19.6	14.6	20.8	17.3	18.1	20.0
10/19/2002	12.3	9.2	20.4	15.5	15.6	18.4
10/20/2002	11.7	10.1	19.0	14.3	15.3	18.1
10/21/2002	17.2	18.4	19.3	17.9	17.5	19.0
10/22/2002	16.3	14.9	19.2	16.3	20.0	19.3
10/23/2002	15.8	15.2	19.4	15.6	18.1	19.0
10/24/2002	15.2	16.2	19.3	14.7	18.6	18.9

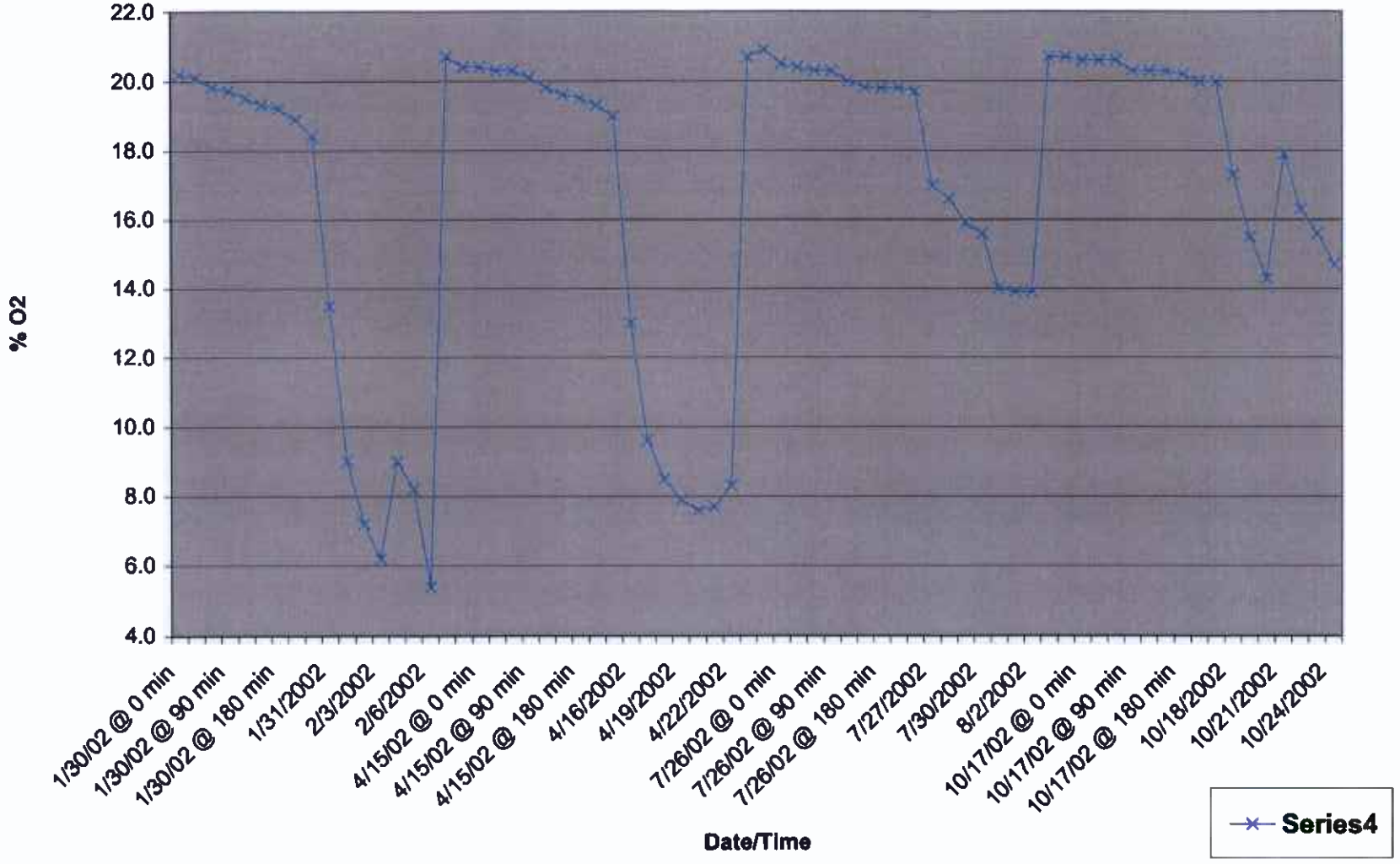

Oxygen Comparison
MP-1 at 10 ft bgs
%O2
23.0
21.0
19.0
17.0
15.0
13.0
11.0
1/30/02 @ 0 min
1/30/02 @ 60 min
1/30/02 @ 120 min
1/30/02 @ 180 min
1/30/02 @ 240 min
2/1/2002
2/3/2002
2/5/2002
2/28/2002
4/15/02 @ 0 min
4/15/02 @ 60 min
4/15/02 @ 120 min
4/15/02 @ 180 min
4/15/02 @ 240 min
4/17/2002
4/19/2002
4/21/2002
5/15/2002
7/26/02 @ 0 min
7/26/02 @ 60 min
7/26/02 @ 120 min
7/26/02 @ 180 min
7/26/02 @ 240 min
7/28/2002
7/30/2002
8/1/2002
8/15/2002
10/17/02 @ 0 min
10/17/02 @ 60 min
10/17/02 @ 120 min
10/17/02 @ 180 min
10/17/02 @ 240 min
10/19/2002
10/21/2002
10/23/2002
Date/Time
Series1


Oxygen Comparison
MP-1 at 20 ft bgs
%O2
23.0
21.0
19.0
17.0
15.0
13.0
11.0
9.0
7.0
5.0
1/30/02 @ 0 min
1/30/02 @ 90 min
1/30/02 @ 180 min
1/31/2002
2/3/2002
2/6/2002
4/15/02 @ 0 min
4/15/02 @ 90 min
4/15/02 @ 180 min
4/16/2002
4/19/2002
4/22/2002
7/26/02 @ 0 min
7/26/02 @ 90 min
7/26/02 @ 180 min
7/27/2002
7/30/2002
8/2/2002
10/17/02 @ 0 min
10/17/02 @ 90 min
10/17/02 @ 180 min
10/18/2002
10/21/2002
10/24/2002
Series2
Date/Time

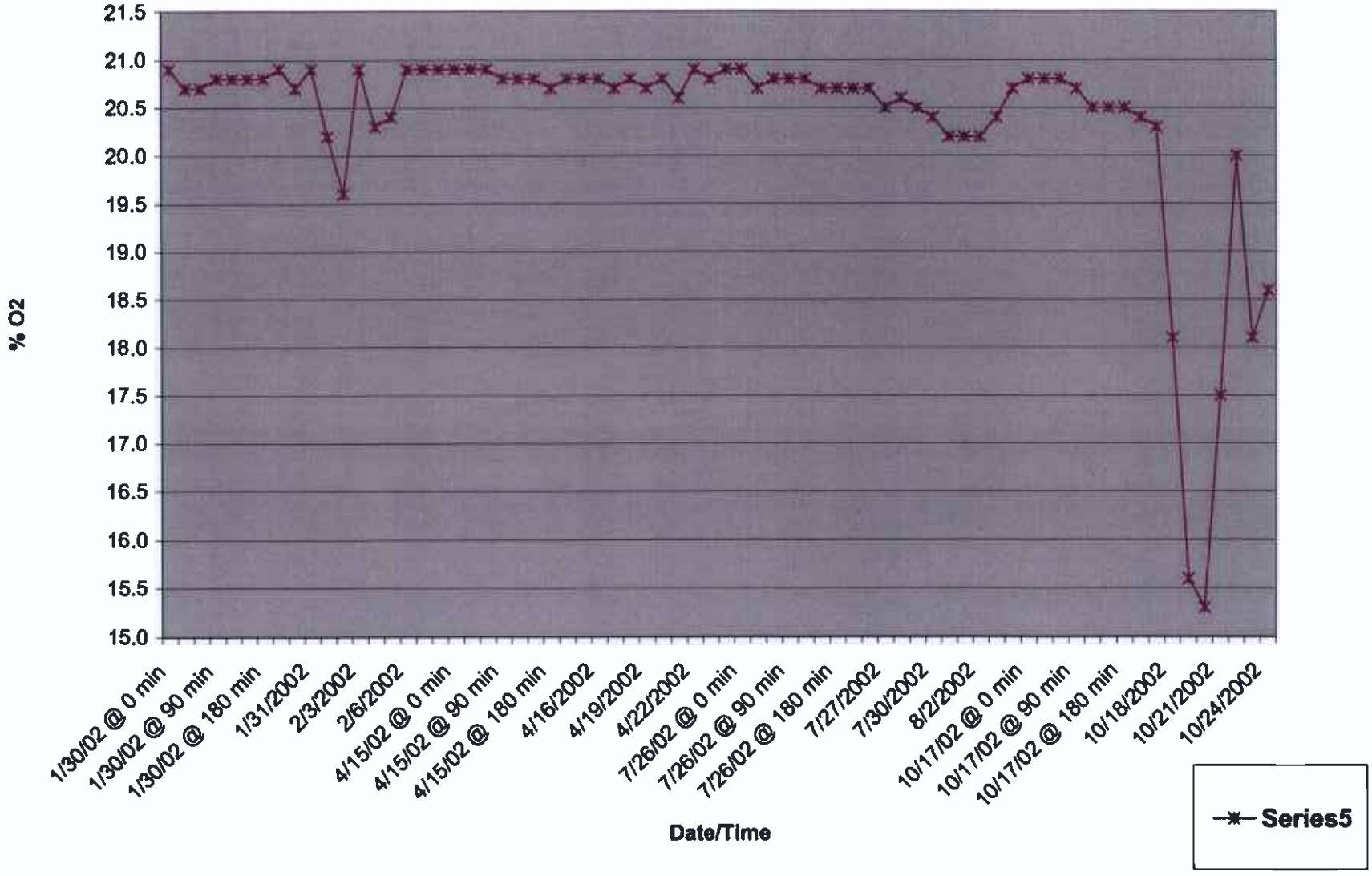
Oxygen Comparison
MP-2 at 10 ft bgs



Oxygen Comparison
MP-2 at 20 ft bgs



Oxygen Comparison
MP-3 at 10ft bgs



Oxygen Comparison
MP-3 at 20ft bgs